MAY 27, 1961

Chemical Week

A McGRAW-HILL PUBLICATION PRICE FIFTY CENTS

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ON THE COVER: The rising turnover in executive manpower is partly due to discontented executives—and for an insight into the principal causes of their unrest, see p. 35.

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Chemical Week (including Chemical Specialties and Chemical Industries) is published weekly by McGraw-Hill Publishing Co., James H. McGraw (1860-1948), founder. EXECUTIVE, EDITORIAL, CIRCULATION AND ADVERTISING OFFICES: McGraw-Hill Building, 330 West 42nd St., New York 36, N. Y. Telephone, LO 4-3000; Teletype, TWX N.Y. 1-1636; Cable, McGRAWHILL, N.Y. Place of publication: Philadelphia, Pa. Second class postage paid at Philadelphia. (See below for directions regarding subscriptions or change of address.) OFFICERS OF THE PUBLICATIONS DIVISION: Nelson L. Bond, president; Shelton Fisher, Wallace F. Traendly, senior vice-presidents; John R. Callaham, vice-president and editorial director; Joseph H. Allen, vice-president and director of advertising sales; A. R. Venezian, vice-president and circulation coordinator. OFFICERS OF THE CORPORATION: Donald C. McGraw, president; Joseph A. Gerardi, Hugh J. Kelly, Harry L. Waddell, executive vice-presidents; L. Keith Goodrich, vice-president and treasurer; John J. Cooke, secretary.

United States and United States possessions subscription rate for individuals in the field of the publication, $3 per year; single copies, 50¢. Foreign subscription rates per year: Canada, $4; other Western Hemisphere countries, $15; all others, $25, payable in advance. Printed in U.S.A. Title registered in U.S. Patent Office.
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Does NAM Represent You?

CPI MANAGEMENT MEN might profitably spend an hour or so reading "Industry Believes," the 1961 edition of which was just published by the National Assn. of Manufacturers (2 East 48th St., New York 17, N.Y.).

This is a compilation of the official policies on current problems adopted by NAM's Board of Directors. These policies are promulgated by the various NAM committees representing more than 3,000 member companies of all types and sizes, and from all industries. A policy statement adopted by majority vote of the appropriate committee is referred to the directors, who must approve it by a two-thirds majority to make it official.

The new edition is the result of this forum of opinion operating continously during the year immediately past and for many years prior to that. All existing policies are reviewed annually, and new policies are developed to meet newly arising problems and proposals of public interest.

NAM is not modest in advancing its proposals. "The policies," says NAM President John W. McGovern, "seek to present to the American public the best thinking that American industry can bring to bear on public affairs, in full confidence that their implementation . . . will result in the maximum growth of our economy and greatest good to the greatest number in our society."

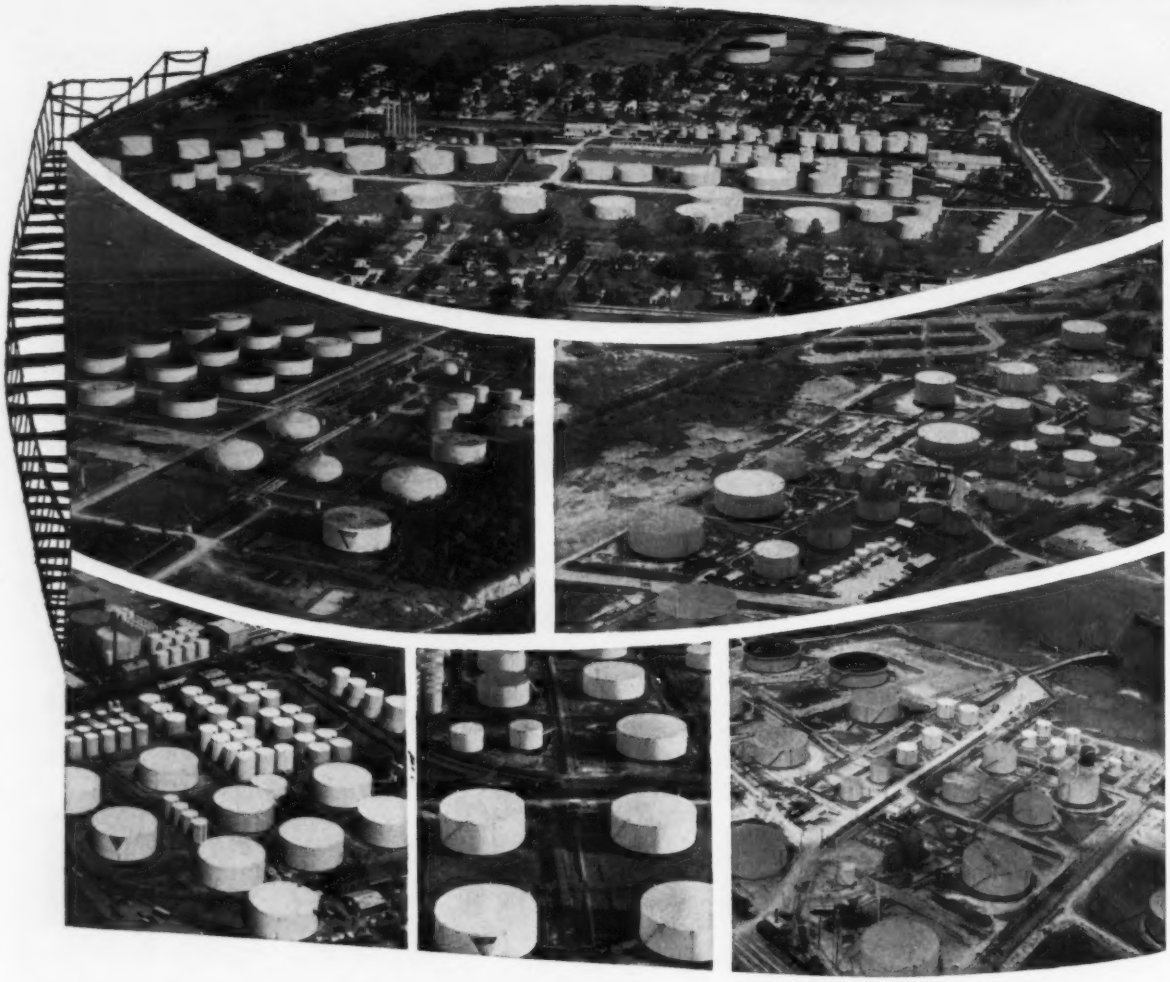
Thoughtful businessmen will agree with many of the positions taken by NAM during the past year. Fertilizer marketers in the TVA demonstration area, for example, will hail NAM's stand against government competition with private enterprise.

A smaller majority, perhaps, will share NAM's stand in favor of "right-to-work" laws that ban the requirement of union membership as a condition of securing and keeping a job. Still fewer, we think, will agree that unions should be prohibited from collecting and using funds for political purposes. Most Americans will defend the right of almost any organization to plead its cause. On the other hand, most will agree that strikes should be settled with a minimum of government intervention, and that under no circumstances should there be any action to permit the imposition of terms or recommendations for settlement.

Petroleum refiners, particularly, will agree with NAM in the current fuels policy controversy: "The association believes that the consumer should have a free choice of the type of fuel energy that he wants to use, and is, therefore, opposed to any legislation . . . leading to the establishment of end-use control of energy. . . ."

NAM also proposes a $2.9-billion reduction in the '62 budget originally submitted by President Eisenhower. It would accomplish this by nonenactment of new obligational authority, budget recommendations for greater nonfederal financing, and elimination of federal grants-in-aid for public assistance, vocational rehabilitation, maternal and child-health services and other public health services. NAM would also trim future budgets by terminating federal aid to urban renewal and to education. Such proposals reinforce the image that NAM projects to the public at large—a body with a head but no heart.

Industry leaders may agree or disagree with specific NAM policies. But they owe it to themselves to learn what their spokesmen are advocating, and to clarify their own opinions by cogitating on the arguments set forth. And they owe it to the nation as citizens to express their viewpoints to the Congress and other law-making bodies.



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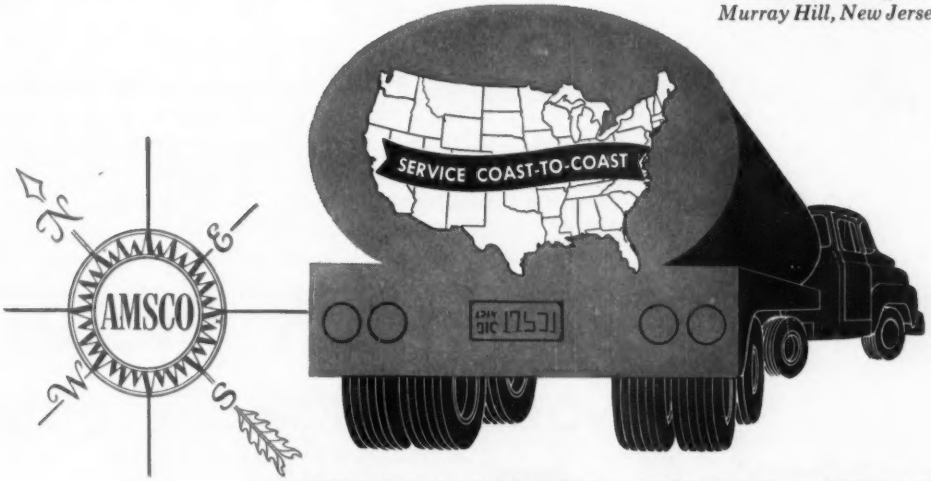

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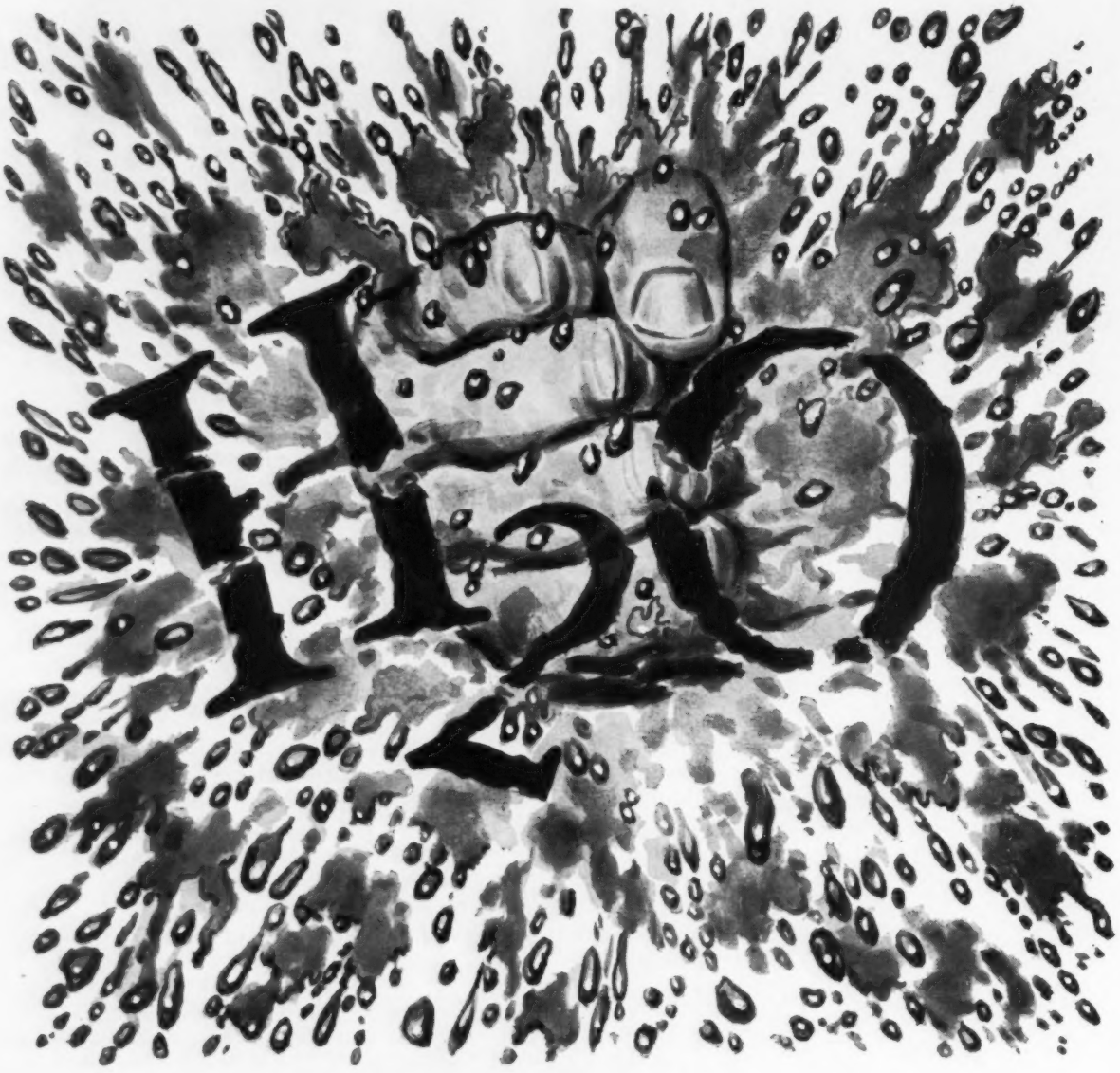

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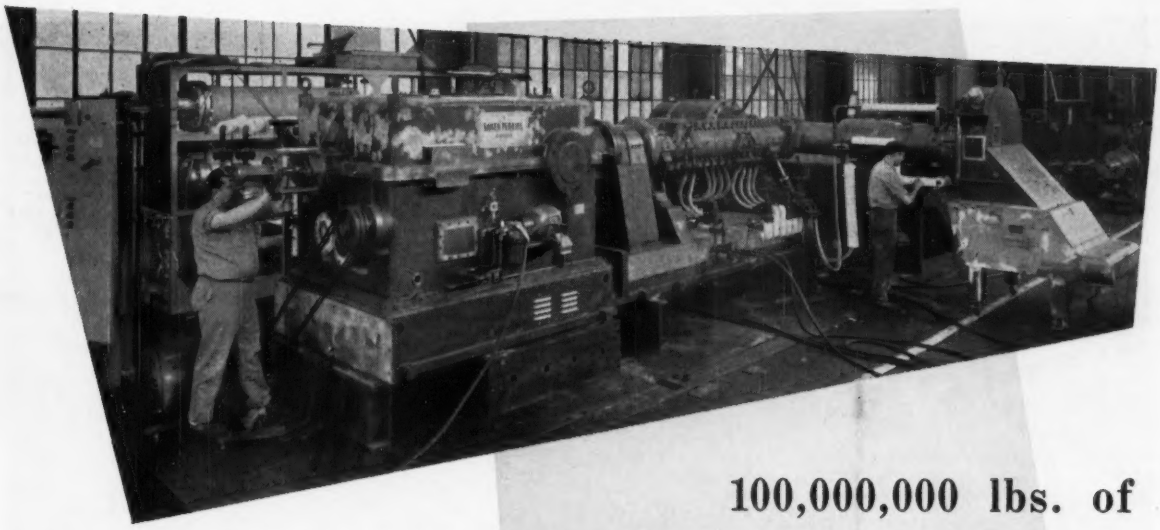

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*These units are shown in top photograph.

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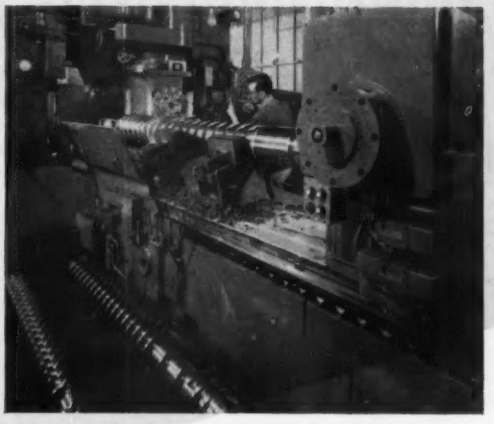

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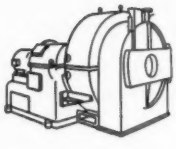

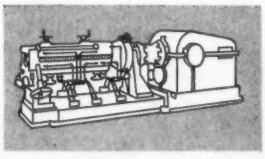

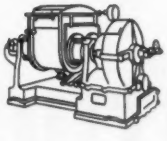

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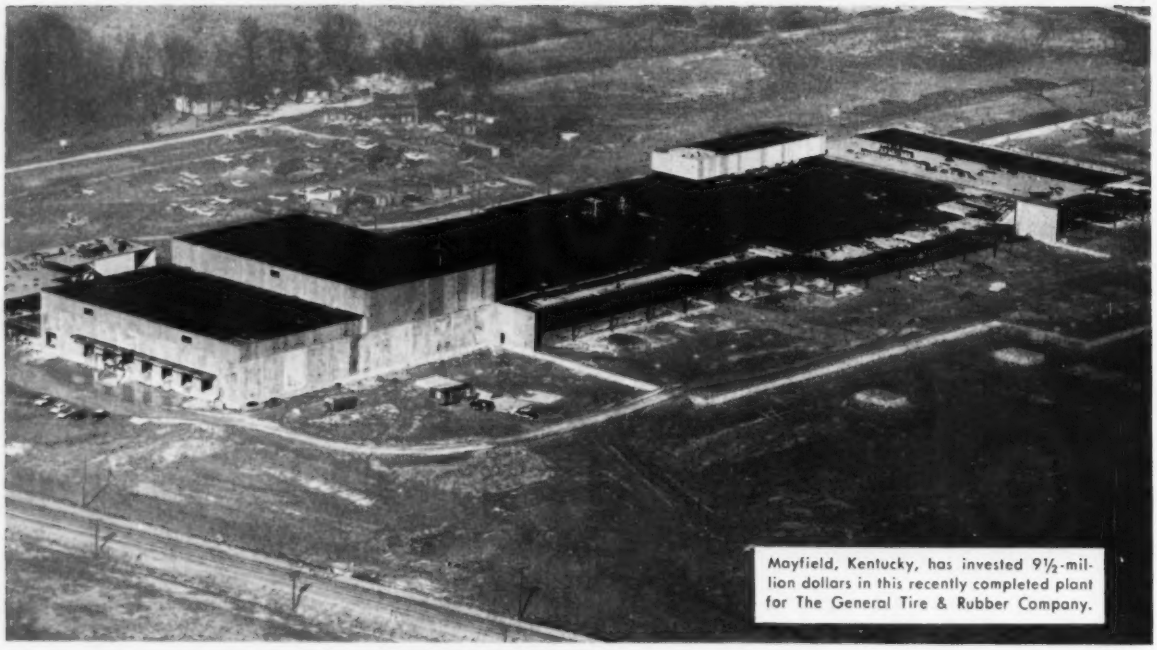

Mayfield, Kentucky, has invested 9½-million dollars in this recently completed plant for The General Tire & Rubber Company.

KENTUCKY offers more industrial FINANCING PLANS than any other state!

THANKS partly to Kentucky's natural advantages, and partly to its *unique* combination of new-plant financing plans to supplement the usual commercial financing, more great and successful companies are now negotiating or building new plants in this fast-growing State than ever before in history.

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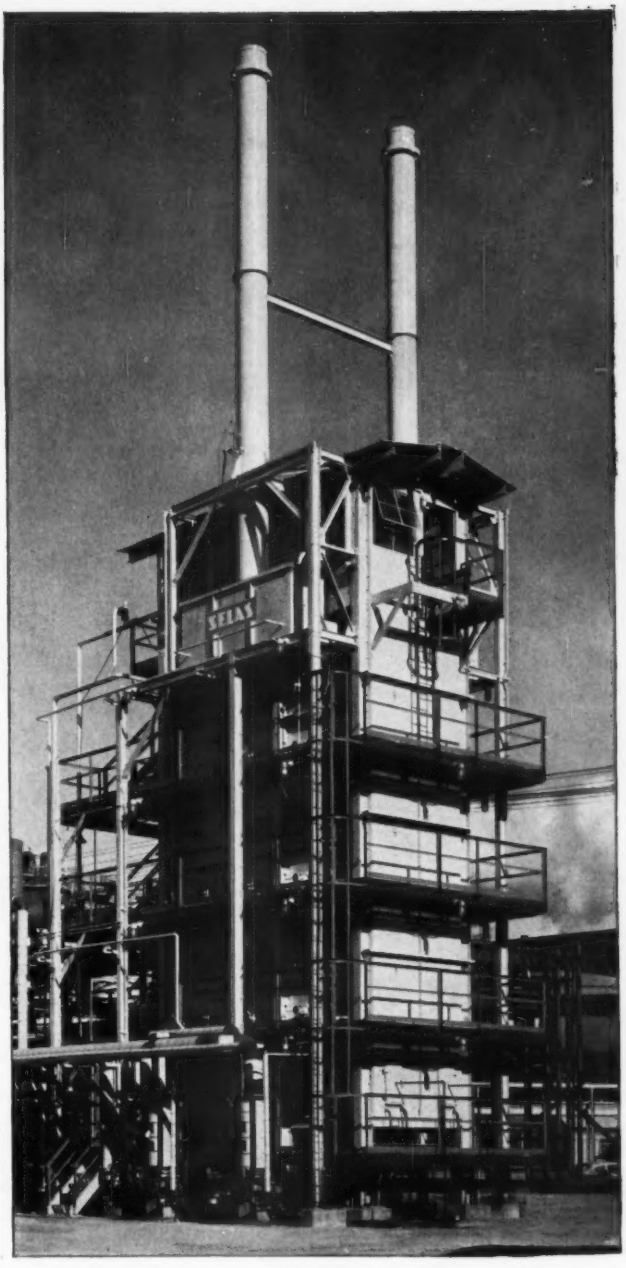

An outstanding feature of Gulf Oil Corporation's new oxo alcohol plant in Philadelphia, Pa., is the unique design of the Selas furnace which permits simultaneous production of synthesis gas and relatively pure hydrogen, in one firebox containing no internal partition walls.

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Technical details on the application of this type Selas unit for production of hydrogen, methanol-synthesis gas, and oxo-synthesis gas are contained in a paper "Catalytic Steam Reforming of Light Hydrocarbons For The Production of Hydrogen and Synthesis Gas," presented by Selas engineers at the A.I.Ch.E. annual meeting, February 26, 1961, in New Orleans.

Copies of this paper are available. Write to Mr. R. J. Kenard, Fluid Processing Division.

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The unusual permanence properties of MONOPLEX S-73 stem from: (1) its stabilizing effects against heat and ultraviolet light degradation, (2) low volatility, (3) good compatibility with PVC, even under rigorous exposure conditions, (4) better resistance to migration than normally shown by low-temperature plasticizers. Excellent color and clarity of MONOPLEX S-73 make it an ideal choice for transparent rainwear, rear windows for convertibles, and auto seatcovers. Its viscosity properties are excellent for plastisol uses. Economy comes from moderate price and low specific gravity. Write for two free booklets: *Performance Properties of* PARAPLEX® *and* MONOPLEX *Plasticizers*, and *Properties of Plastisols.*

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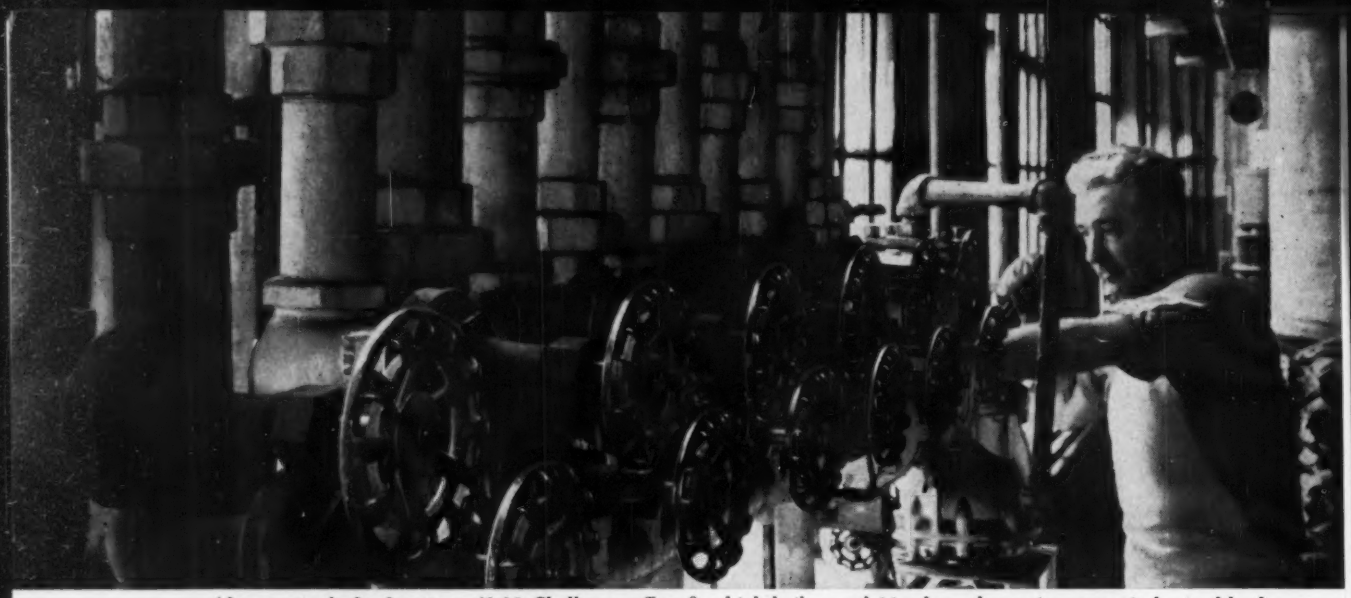

Above, a typical solvent manifold. Shell now offers five high boilers and 11 other solvents in economical mixed loads.

SOLVENTS:

Shell Chemical now offers 5 high boilers, 2 medium boilers, 2 low boilers, 4 latent solvents, 2 mutual solvents and 1 unclassifiable, all with mixed load savings

With the addition of three high boiling solvents—methyl amyl acetate and the completely new Pent-Oxone* keto-ether and Pent-Oxol* glycol ether—Shell now offers you a full formulating range with all the bulk price benefits of single-source supply.

Glance through these 16 solvents listed below. See how many you are using currently. If there are any you are not using, perhaps you would like samples of them.

IN AUGUST, 1960, Shell Chemical introduced Pent-Oxone, a double-action keto-ether high boiling solvent.

At the same time Shell introduced Pent-Oxol, a glycol ether solvent with especial promise as a blush retarding, reasonably quick drying high boiler for nitrocellulose.

Now, to round out the high boiling line, Shell Chemical has added methyl amyl acetate.

5 high boilers

This brings Shell's list of high boilers to five. Pent-Oxone, Pent-Oxol, methyl amyl acetate, ethyl amyl ketone and diacetone alcohol.

2 medium boilers

Shell's major medium boiler scarcely needs an introduction. It's methyl isobutyl ketone.

Shell's second medium boiler is mesityl oxide, an unsaturated ketone with very strong solvent properties.

2 low boilers

Like methyl isobutyl ketone, Shell's two low boilers are industry standards: methyl ethyl ketone and acetone.

4 latent solvents

Shell's four latent solvents are ethyl alcohol, isopropyl alcohol, methyl isobutyl carbinol—an isomeric hexyl alcohol—and secondary butyl alcohol, a solvent for many natural resins, gums and oils.

2 mutual solvents

Hexylene glycol and tertiary butyl alcohol are excellent co-solvents for many immiscible substances.

Unclassifiable

Isopropyl ether is not so easy to put a tag on. It is an extractant for fine chemicals, a solvent for ethyl cellulose, and frequently is used to replace ethyl ether where a solvent of lower volatility is wanted.

Mixed load savings

These 16 solvents are all available in tank cars to drums from any of Shell's nine Industrial Chemical offices. Send for samples. And ask the man from Shell how you can save money through mixed load purchases.

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SHELL

Industrial Chemicals Division
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Business Newsletter

CHEMICAL WEEK
May 27, 1961

Du Pont ordered to sell all General Motors stock. In a 4-3 decision Monday, the Supreme Court ruled that Du Pont must divest itself of its 63 million shares of GM stock (a 23% interest) as the only way to satisfy what the Court had earlier found was a violation of the Clayton Antitrust Act.

After proposals and counterproposals from both Du Pont and the Justice Dept. are resolved—and this could involve still another appeal to the Supreme Court—the Wilmington firm will have up to 10 years to complete the divestiture.

Du Pont's first reaction to the court's decision was a concern for the tax problems likely to confront Du Pont stockholders who may eventually share in any distribution of the GM stock. Says a company spokesman: "The Supreme Court's decision creates an urgent need for Congressional action to protect hundreds of thousands of innocent stockholders from serious and irreparable injury."

•

Also in Washington, the U. S. Glass industry may get a break. The Tariff Commission last week recommended that President Kennedy increase the tariff on imported glass to protect the domestic industry from "serious injury."

The commission was unanimous in its finding that the duty on sheet, cylinder and crown glass should be raised (under the escape clause of the Trade Agreements Extension Act) but disagreed on the amount of the increase that should be ordered.

•

Diamond Alkali is branching out. Last week the company's board of directors gave final approval to plans involving the acquisition of Chemical Process Co. (Redwood City, Calif.) and Bessemer Limestone & Cement (Youngstown, O.). Okay on the Diamond-Bessemer merger was anticipated last month (*CW Business Newsletter, April 22*).

Diamond will recommend to stockholders that 500,000 shares of no-par preferred be issued in place of 250,000 shares of currently authorized $100-par convertible preferred. The new stock—to have an annual dividend rate of $4—will be used to acquire both Bessemer and Chemical Process.

Diamond, reportedly will issue one share of the new $4 preferred for each three shares of Bessemer outstanding. That means $27 million worth of Diamond stock for the 796,494 shares of Bessemer outstanding.

The Diamond-Chemical Process merger plan is subject to agreement by shareholders of both companies. The proposal now calls for the

exchange of one share of the new Diamond Alkali convertible preferred stock for each 8⅓ shares of Chemical Process common. The new preferred stock will be convertible into 1.3 shares of Diamond common.

Chemical Process shareholders will vote on the proposal at a special meeting Aug. 15. If okayed, the merger will become effective Aug. 31.

The West Coast firm specializes in the manufacture of ion-exchange resins, polyesters and adhesives, and has been growing at a rate of about 20%/year. Sales last year were $6.1 million; in '55, about $2.2 million.

•

Competition in phosphates will get rougher; and in at least two prospective deals, long-range shipping will be a key factor:

• According to industry sources, Dow is considering entry into the phosphate business, using low-cost, but fairly high-grade, ores from Africa. The raw material could come from Senegal.

• Collier Carbon and Chemical reportedly is looking for a joint-venture arrangement with some Florida phosphate producer. Object: shipment of high-grade Florida ore via the Panama Canal to Collier's phosphoric and phosphate plants in California.

• A Canadian company, Consolidated Mining & Smelting (Montreal), is considering a $4-million phosphate mining and processing project in Montana. The operations would be handled by a U.S. subsidiary, Montana Phosphate Products, depend on Granite County ore deposits acquired from International Minerals & Chemical.

•

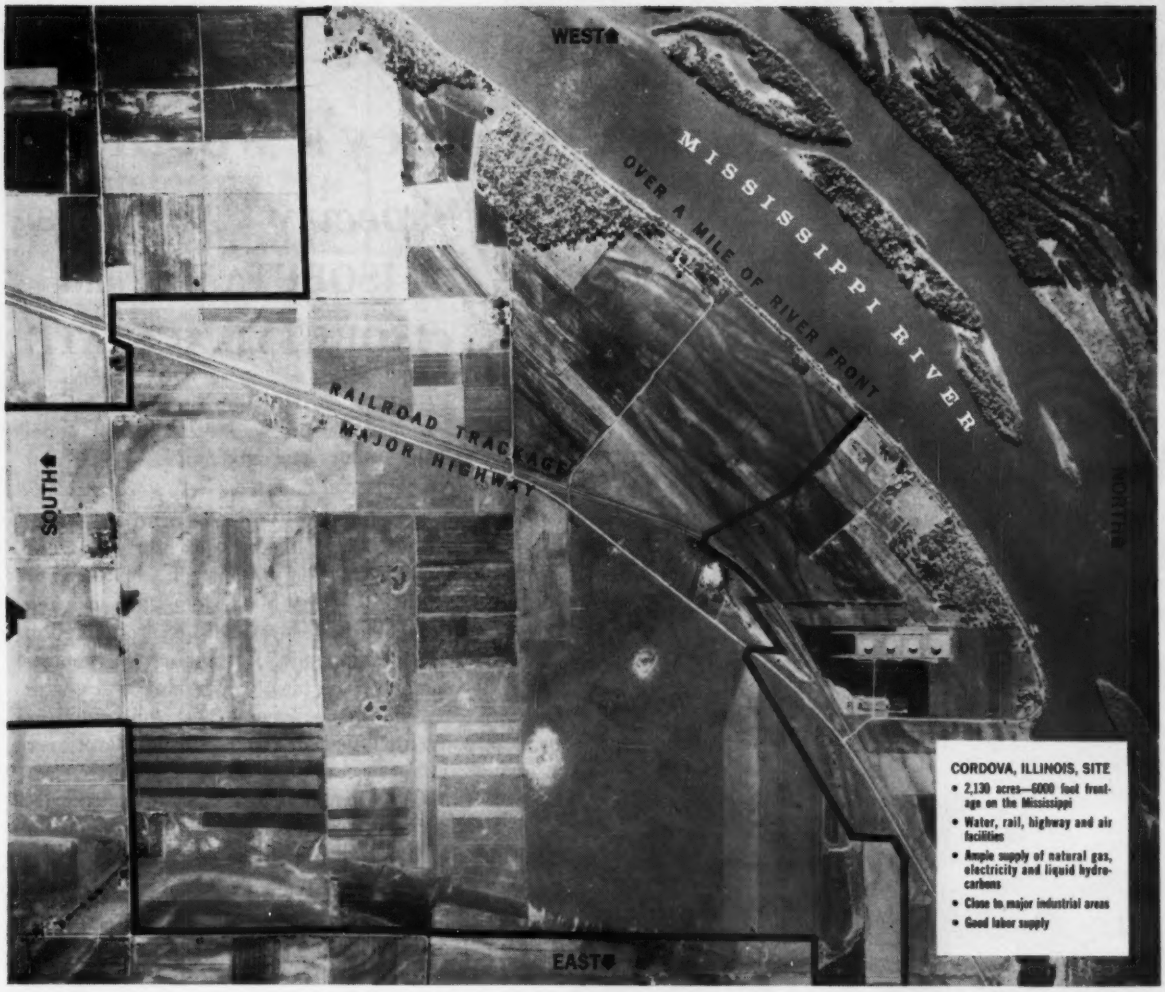
Sinclair will pay $4.7 million as its share of the funds needed to complete the Sinclair-Koppers Chemical styrene plant in Houston. This will be in addition to the $16-million capital investment the company is making in refining and petrochemicals expansions. (Sinclair has started production of *o*-xylene at Houston and will soon start up a heptenes unit at its Wood River, Ill., refinery.)

•

Despite its domestic court problems, Du Pont goes ahead with foreign expansions. The company will build Mexico's first tetraethyl lead plant an $8-million unit at Tampico, in conjunction with Pemex, the Mexican government's oil and petrochemical agency.

Du Pont will own 49% of the joint venture, will supply some capital and design and engineering know-how for the plant. Construction is expected to start later later this year.

Capacity hasn't been revealed, but the plant will be big enough to supply Mexico's TEL needs (it imports some $6 million worth annually) and allow exports to other Latin-American markets. Chief raw materials will initially be imported, later produced locally.



A NEW SITE THAT *HAS EVERYTHING* A CHEMICAL COMPANY NEEDS!

On the Mississippi River in Rock Island County, Illinois, fifteen miles northeast of the Quad Cities, is a brand new industrial tract called the Cordova site. This site is tailor-made for chemical process industries. Raw materials in the form of liquid petroleum gases and other industrial location advantages are now available—close to a major consuming market on a principal waterway.

Located near the town of Cordova, it consists of 2,130 acres of level flood-free land with 6000 feet of river frontage, and extends up to one and a half miles back from the river. The topography is level to gently rolling.

AN ABUNDANCE OF LPG, WATER AND POWER

LP and natural gas pipelines serve the area. In conjunction with a liquid extraction plant now under construction in Kansas, these lines will permit supplying chemical feed stocks at the Cordova site. An unlimited supply of dependable power is assured by two large generating stations in the Quad Cities and interconnections with others throughout the Middle West. Water, another basic CPI raw material, may be withdrawn from the Mississippi in unlimited quantities. Deep wells in the area supply pure water. Treated sewage may be emptied into the river.

LOCATED IN ONE OF THREE GREATEST GROWTH MARKET AREAS IN NATION

Within a 300 mile radius of Cordova are such major industrial centers as: Chicago, Gary, Fort Wayne, Minneapolis-St. Paul, St. Louis, Des Moines, Quad Cities, Rockford, Omaha. And in the area immediately surrounding, there is an ample supply of high-type labor.

EXCELLENT WATER, RAIL, HIGHWAY, AIR TRANSPORTATION

The navigable channel of the Mississippi River, open for traffic 9½ months of the year, extends along the entire river frontage close to shore. Two miles of railroad track cross the site, connecting with mainline junctions at Savanna, Illinois, and the Quad Cities. A major highway parallels the rail right-of-way . . . and the Quad-City Metropolitan Airport is only minutes away.

The availability of liquid petroleum gases, location on a principal waterway, nearness to a major consuming market — three solid reasons why the Cordova site is ideally suited to chemical and petrochemical companies.

For more information, contact —

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Let a CARBIDE Technical Representative show you how the full line of solvents can be put to work to save you more and serve you better. Call your nearest CARBIDE office, or write to Union Carbide Chemicals Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, New York.

UNION CARBIDE CHEMICALS COMPANY

UNION CARBIDE

Bolstering the Bullish Outlook

Prospects for $30-billion sales of chemicals and allied products this year are rising this week as business activity continues to perk up in autos, steel, construction and other key industries. This would be an 8% gain over last year's chemical sales total—$27.8 billion.

Auto sales during the first 10 days of May tripped along at the rate of 18,348 domestic units/day —a figure high enough to prompt Chevrolet's Edward N. Cole to raise his sights to a 6-million-unit industry total for the calendar year.

Steel ingot production has jumped from a weekly average of about 1.35 million tons in December to nearly 2 million tons. Output for first-quarter '61 was 4% more than in fourth-quarter '60; and Republic Steel's T. F. Patton thinks this second quarter "may be 20-25% better than the first."

Chairman Melvin H. Baker of National Gypsum tells CHEMICAL WEEK he sees an upturn in all forms of construction "starting right now," with second-half expenditures to be up 15%.

Different segments of the chemical industry will derive different degrees of sales growth during the '61 recovery, Stauffer Chemical's Hans Stauffer points out. Addressing the 45th annual meeting of the National Industrial Conference Board in New York's Waldorf-Astoria Hotel late last week, Stauffer predicted these sales increases for '61:

Heavy chemicals, 2-3%; synthetic resins, plastics and fibers, 4-5%; synthetic organic chemicals, 10%; pharmaceuticals, 10%; agricultural chemicals, 1-2%; detergent and cosmetic chemicals, 2-3%; and industrial gases, 10%.

And NICB economist Martin Gainsbrugh summed up: "Economic expansion promises to grow increasingly vigorous in the second half of the year."

Rubber Race Heats Up

Stereospecifics, polyurethane, butyl, ethylene-propylene all are competing with SBR for job of taming natural rubber prices.

A report that Du Pont has developed an abrasion-resistant polyurethane tire came as a new jolt to the synthetic rubber industry this week. Du Pont calls the reports unfounded. But the mere possibility that highly durable urethane tires might be on the road in two years or so is further obscuring already confused industry predictions. Muddying the waters: a scattering of new plans for production of the stereospecific rubbers, *cis*-polybutadiene (PB) and *cis*-polyisoprene (PI).

Phillips Chemical's 25,000-long tons/year polybutadiene plant at Borger, Tex., has now been followed by first production from Firestone's 30,000-long tons/year Orange, Tex., plant. This fall, Goodyear will have a 10,000-l.t./year plant onstream at Beaumont, Tex.; it will be capable of making either PB or PI. And Goodrich-Gulf is hastily converting its unneeded (because of the general overcapacity) SBR plant at Institute, W. Va., to PB production (10,000 l.t./-year at the start).

The industry doesn't consider such conversions to be feasible as general practice, considers this case to be Goodrich-Gulf's way of salvaging something from what had become a white elephant. Most producers expect SBR overcapacity for the foreseeable future; increased rubber demand will be taken up by the new stereos and other, yet-to-come, synthetics.

SBR Has Edge: The stereos will not directly replace SBR, however—at least not immediately. Many believe they never will. Stereos would have to be able to undercut SBR's price and, no matter how production engineering improves, in any price war SBR would have the one big advantage of paid-for plant. Because the same companies make both SBR and the stereos, intense price competition is not likely.

But by and large, price will be the key to the coming elastomer battle; and the primary factor will, as always, be the price of natural rubber. The main economic function of the new stereos now—and the reason SBR makers are bringing forth new competitors for their already underworked plants—is to help control the price of natural. In Akron the past few years it has been virtually axiomatic that the health of a rubber company depends more on its ability to buy natural at the right time and price rather than on anything it does with technology or merchandising.

Price Drop Coming: Natural rubber is now selling at about 30¢/lb., high because of the war in Laos. During the coming winter it will probably drop to about 25¢/lb. and could go much lower in the long run. New types of trees and agricultural chemicals permit yields of 2,000 lbs./acre, double the prewar figure, and make natural rubber profitable even at prices approaching 10¢/lb.

Makers of the stereos are therefore busy working out ways to not only meet natural's present price but also leave room for future price cuts. They are taking two approaches: (1) obtaining cheaper feedstocks (*CW, May 6, p. 73*), and packing the rubber with extender, usually oil. Butyl and

RUBBER NEWCOMERS:

U. S. Outlook to '65 (thousand long tons)*

	'60			'65		
	Supply	*Demand*	*Excess*	*Supply*	*Demand*	*Excess*
Polybutadiene	—	—	—	220	205	15
Polyisoprene	5	5	—	150	140	10
Butyl	118	64	54	155	100	55
SBR	1,353	902	451	1,515	953	562
Natural	490	490	—	320	320	—

* Estimates by R. P. Dinsmore, Goodyear Tire & Rubber Co. (retired).

STEREORUBBER:

Capacity Now Planned (thousand long tons)

	Year Onstream	*Location*	*Poly-isoprene*	*Poly-butadiene*	*Either or Both*
UNITED STATES:					
American Synthetic Rubber	'61	*			30
Firestone	'61	Orange, Tex.			30
General Tire	'62	*			25**
Goodrich-Gulf	'62	Institute, W.Va.		10	
Goodyear	'61	Beaumont, Tex.			
	'62	Beaumont, Tex.			30†
Phillips	'60	Borger, Tex.			
	'61	Borger, Tex.		25†	
Shell	'60	Torrance, Calif.			
	'61	Torrance, Calif.	18†		
	'62	Marietta, O.	35		
	'63-'65	Torrance, Calif.		18	
Texas-U.S.	'63-'65	*			20**
		TOTAL U.S.	**53**	**53**	**135**
FOREIGN:					
Shell	'62	France		25	
Firestone	'63-'65	France		20**	
ANIC	'63-'65	Italy		15**	
Huels	'62	Germany		20**	
Shell	'62	Netherlands	25		
Shell	'63-'65	U.K.		25	
Fish	'64-'65	Argentina		20**	
Coperbo	'63-'65	Brazil		25	
Polymer	'62	Canada		20**	
Japanese Synthetic Rubber	'63-'65	Japan		20	
Maruzen (Montecatini)	'63-'65	Japan		20**	
		TOTAL FOREIGN	**25**	**210**	**—**

* Not known. ** Estimated. † Total capacity at this location.

the still experimental ethylene-propylene copolymer have lowest raw materials costs; but fabrication costs are high and more than offset this advantage. The next most expensive raw materials go into SBR, followed by PB. Most expensive: PI.

Much of SBR's price advantage stems from its ability to be extended with oil. This is done under a patent (currently in dispute) held by General Tire. The cheaper oil can now replace about 28% of SBR in tires; higher extender levels are likely. The new rubbers are expected to lend themselves to oil extending (natural cannot be oil extended), and the degree to which this is possible will have much bearing on future relative prices.

Many think that polybutadiene will ultimately become the No. 1 tire rubber. Unlike polyisoprene, which at best can duplicate natural rubber (right now it's considered about 90% as good, lacks natural's good adhesion for tire building), polybutadiene does not have to compete strictly on price. It can show advantage in wearability. PB has been difficult to work, and was finding its way into tires only as an extender, in roughly 50-50 combinations, for natural rubber. Now, however companies are beginning to come out with 100% PB tires. Most rubber men say, however, that SBR will remain the work horse, and nothing will supersede it without beating its price.

This would seem to be true on passenger cars, where SBR does an adequate job and other rubbers so far have been able to compete only in limited-sales premium tires. Butyl rubbers for tire carcasses, for example, are not expected to become a major factor because only a minority of tire buyers feel its advantages—low noise and better braking power—counterbalance higher price and poorer wear characteristics. The current swing to compact cars is also working against butyl. Reason: the compacts don't have enough horsepower to overcome sluggish performance stemming from butyl's road-hugging tendency.

Still, Cities Service and Thiokol are reported to be discussing a new butyl venture. Jersey Standard is now the only U.S. producer.

Olefin Prospects: Also coming up: several new copolymers, most notably ethylene-propylene (EP), which

could be a 10-12¢/lb. elastomer suitable for tires if research removes some disadvantages. EP needs, and doesn't yet have, (1) a nonperoxide rapid cure and (2) improved treadwear, now 20-30% below normal tires. Du Pont has made big strides here, too, by developing a self-curing EP copolymer, and many in the industry feel the new elastomer has at least a long-term outside chance to become a big item.

It seems likely that the race will become more complicated before a victor clearly emerges. Much of the race will probably be on paper—there won't be a lot of switching because changing tire-making processes is expensive.

When they aren't worrying about which rubber to put their money on, tire makers ponder the prospect of no tires at all. Two possibilities darken their brow: the new experimental vehicles that ride on cushions of forced air, and a plan now fermenting in Detroit to eliminate spare tires, rely on punctureproof constructions.

Letup on License Law

Two Japanese government agencies have shaken hands over a plan to cut some of the red tape concerning applications for technical licensing agreements in that country. This could make it simpler and easier for U.S. companies to license chemical products and processes to Japanese concerns.

Up to now, negotiations on such contracts have been complicated by the frequent inability of the two government agencies to see eye-to-eye on any given proposal. The Ministry of International Trade and Commerce (MITI) would give its blessing, but the Ministry of Finance would kill the deal by refusing to allocate foreign currency (such as U.S. dollars) for royalty payments.

Last week, the Finance Ministry agreed "in principle" to go along with MITI as a general procedure. But U.S. companies are keeping their fingers crossed, waiting to see how the new policy will work out in practice. They note that the Finance Ministry laid out three exceptions to the new procedure; and those exceptions—e.g., "when domestic industry is liable to be hurt"—could be interpreted very broadly.

Counting '64 Chickens

Texas Gulf Sulphur Co. (New York) is merely "optimistic" about its sulfur business but is "bullish" about its $30-million potash project—a venture that President Claude O. Stephens predicts will add at least $5 million to TGS' annual net earnings (last year they were $12.7 million).

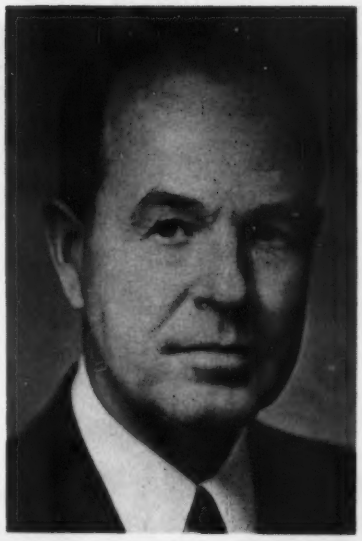
The potash mine and refinery are already under construction in the Orange Cliff mountains near Moab, Utah. Production is scheduled to begin late in '62 and to reach initial design capacity—1.1 million tons/year of muriate of potash—by late '63. The Denver & Rio Grande Western Rail Road Co. is building a 36-mile spur line (including a 7,000-ft. tunnel to be blasted through solid rock) to the plant site. Freight rates have been set that will enable TGS to compete in all U.S. potash markets except near Atlantic seaports (where potash from Europe usually undersells domestic materials).

Stephens—who appeared before some 300 security analysts in New York last week—anticipates no major obstacles for this venture. He said the mine shaft (ultimately to be 2,800 ft. deep) is already down to the 80-ft. level.

TGS management holds that its new production will have no impact on potash prices. "We believe that our potash will merely fill a gap between supply and demand that is already widening," Stephens declared. He cited findings by Arthur D. Little (Cambridge, Mass.) that probable total demand for U.S. and Canadian potash for the fertilizer year beginning July 1, '63, will be 5.58 million tons; and by that time, according to TGS estimates, all U.S. and Canadian production—except Utah—will be only about 4.85 million tons.

In other diversification moves, TGS will be appraising its Alberta natural gas discovery and its lead and zinc claim in the Canadian Arctic this summer; but its lithium deposit in North Carolina "is being held in abeyance for future needs."

New efforts in sulfur this year will include a pilot-plant development program (in an agreement with Union Carbide Canada) on removal of sulfur from "sour" natural gas and evaluation of tests (in a joint research venture with International Nickel) on recovery of "potentially large tonnages of sulfur" from smelter gases.



Texas Gulf's Stephens: Counting on potash for a big boost in earnings.

Stephens predicts that TGS will ship about the same tonnage of sulfur this year as it did in '60, but that some prices already have improved slightly, making possible a small increase in earnings. He rates as "very good" the chances of a general price increase, observing that industry already has absorbed Mexican and French production. Canadian sulfur, however, "has yet to be coped with," he adds. He thinks that western Canada's landlocked sulfur will be sold, especially in exports to Asia, but that an $8/-ton difference in freight costs would tend to keep Alberta's sour-gas sulfur out of U.S. markets. TGS is optimistic about pipelining Alberta sulfur into the Chicago area.

At present, Stephens estimates, only about 5% of TGS sales volume comes from its sour-gas sulfur plants in Wyoming and Alberta; the rest comes from its four Frasch-process mines in Texas. However, the sour-gas share is increasing.

His views on output in principal producing nations in '61: U.S., up slightly from last year's 5.74 million long tons; France, more than 1 million l.t., up from 780,000; Mexico, about 1.1 million, down from 1.36 million. Canada, whose output will likely top 500,000 l.t. this year, will be a major producer "in the not too distant future," Stephens adds.

Amoco's Forrester, eyeing ethylene; Gulf's McAfee, sure on cumene.

Faster Petrochemical Pace

Into the light of day last week came firm plans for four petrochemical projects costing an estimated aggregate of $10 million, and preliminary plans for a $10-million ethylene-propylene plant in the Chicago area.

Five oil companies and two chemical companies are behind these projects, which are proposed for construction in four U.S. states and one Canadian province. Principal products, locations and sponsors of these projects:

- Methyl chloride, 60-million-lbs./-year capacity, at Lake Charles La.—joint venture of Ansul Chemical Co. (Marinette, Wis.) and Continental Oil Co. (Houston, Tex.). Construction to begin immediately; completion scheduled for early '62.
- Cyclohexane, ultimate capacity of 15 million gal./year (97 million lbs./year), at Clarkson, Ont.—by British American Oil Co. (Toronto, Ont.). Construction to begin early in '62 and be completed by fall.
- Cumene, 100-million-lbs./year capacity, at Philadelphia—by Gulf Oil Co.'s Petrochemicals Division (Pittsburgh). To be completed by early '62.
- *p*-Xylene, 15-million-lbs./year capacity, at Corpus Christi, Tex.—by Suntide Refining Co., subsidiary of Sunray Mid-Continent Oil Co. (Tulsa, Okla.). To be completed in Jan. '62.

The ethylene and propylene project for the Chicago area is under study by Amoco Chemicals Corp., subsidiary of Standard Oil Co. of Indiana (Chicago). Amoco President Jay Forrester had the preliminary study carried out on the basis that the proposed plant's output of olefins would all be sold to other companies producing chemicals and resins in the Great Lakes and possibly mid-South areas; but since Amoco has done considerable research and development work on polyolefins and processes, it's conceivable that the company might ultimately broaden this project to include a unit for polymers or other derivatives.

With the preliminary survey indicating that Amoco could turn out the olefins in the Chicago area at prices that would be competitive with Gulf Coast prices, the company has authorized a definitive engineering study, hopes this will be completed by the end of this year. Size of the proposed plant, as well as location and other details, would depend on findings of the engineering study; but in general, the industry has come to speak of 200 million lbs./year as a minimum desirable capacity for a new ethylene plant.

Disclosure of Amoco's interest in olefins came just a few days after M. W. Kellogg Co.'s J. A. Knaus and J. L. Pat—in a paper prepared for a Cleveland meeting of the American Institute of Chemical Engineers and the Chemical Engineering Division of the Chemical Institute of Canada—predicted that total ethylene capacity in the U.S. will grow from the present 6 billion lbs./year to about 10 billion lbs. by '70.

At least three sites figure as contenders for the plant if Amoco decides to build: Joliet, Ill., where Amoco already has chemical production facilities plus extensive land holdings that could be used as sites for customers' plants; Whiting, Ind., where American Oil Co. (also a Standard of Indiana subsidiary) has the U.S.'s fifth-largest petroleum refinery; and Aurora, Ill., on the path of a proposed pipeline that would carry natural gas liquids from Alberta to Chicago. But Amoco stresses that these are by no means the only sites that will be considered.

If the plant is built, it could add as much as $10 million/year to Amoco's sales volume, which last year rose more than 50%, to $56 million.

Ansul's Robert C. Hood and Conoco's L. F. McCollum estimate the cost of their methyl chloride project at more than $1 million. They note that this product has been in growing demand as an intermediate for butyl rubber, silicones, methyl cellulose and quaternary ammonium compounds.

Ansul's Hood, Conoco's McCollum:

But industry observers suggest that the most likely sales prospects for the Lake Charles plant's output would be the tetramethyl lead plants to be built at Beaumont and Freeport, Tex., by Houston Chemical and Nalco Chemical, respectively (*CW Business Newsletter, May 20*).

Principal customer for British American's cyclohexane is expected to be Du Pont of Canada, which has been importing this product from the U.S. as raw material for its nylon-6/6 plant at nearby Maitland, Ont. (*CW Market Newsletter, April 29*).

Gulf Oil's Jerry McAfee—in Philadelphia last week for the dedication of the oxo-alcohols plant that he described as the start of an extensive petrochemical complex to be built up around the company's refinery there (*CW, March 11, p. 84*)—said the cumene plant will take the entire output of the benzene unit to be built next, and part of the refinery's propylene production. Gulf says it plans to sell most of the cumene on long-term export contracts.

Suntide's H. A. Brown said the output of the *p*-xylene separation unit to go up at Corpus Christi will be sold under a long-term contract to "a large European chemical complex." This unit—using "a new crystallization process"—will operate in conjunction with Udex, *o*-xylene and ethyl benzene units at the Suntide refinery. It will be the 10th petrochemical project at Sunray's three refineries.

Teaming up on methyl chloride.

Harvey Going Basic

Harvey Aluminum (Torrance, Calif.) is seeking new capital for alumina and rolling mill projects, steps that will take it toward its goal—to become an integrated producer of aluminum and aluminum mill products.

The company has registered with the Securities & Exchange Commission for a public offering of 1 million shares of Class A common stock. Its stock was quoted over-the-counter late last week at $32 bid, $34.625 asked.

Harvey plans to build a $35-million alumina plant, probably in the Caribbean area (it now imports alumina from Japan), and a $40-million, 60,000-tons/year rolling mill, probably on the U.S. West Coast. The company also is considering acquiring additional facilities or another company.

Harvey will buy for $3.6 million the government's aluminum wrought products plant (and equipment) at Adrian, Mich.

In the six months ended March 31, Harvey's sales rose 45.2%, to $41.86 million. After-tax earnings climbed 36.3%, to $3.08 million.

Picking a Path to Profits

Witco Chemical Co. (New York) last week told its stockholders that its polyethers unit just now going onstream at Chicago, plus other new plants scheduled to start up later this year, represents the best route to improved profits.

Chairman Robert I. Wishnick—replying to a woman stockholder who asked why Witco's '60 profit ratio of 3.2% was lower than those of certain larger chemical concerns—said the answer lies in a company's ability to make many of its own starting materials. The larger companies produce a substantial share of their own raw materials and intermediates, he went on, and Witco's two-year, $11-million construction program is aimed in that same direction.

The new unit in the Organic Chemicals Division plant at Chicago illustrates the point. It will convert ethylene oxide and propylene oxide into polyethers for urethane foam, turn out other derivatives for use in detergents and in emulsifiers for insecticides. It is one of the smallest projects on the Witco growth program, costing no more than $500,000.

Three other domestic projects are slated to start up during the second half of '61: Witco's second phthalic anhydride plant, 30-million-lbs./year capacity, at Perth Amboy, N.J.; the 30-million-lbs./year alkyl benzene plant of Witfield Chemical Corp., owned 50-50 by Witco and Richfield Oil Corp., near Los Angeles; and the 50-million-lbs./year carbon black plant of Continental Carbon Co., 20% owned by Witco, at Bakersfield, Calif. Also to start up before year-end are a Witco-U.S. Rubber joint venture in England and a Continental Carbon plant in Japan.

A $1.6-million detergent plant at Chicago went onstream in first-quarter '61 and is now nearing the break-even point, Wishnick reported. But he cautioned his stockholders not to expect significant profits on the other new facilities before second-quarter '62.

Damper on Drug Prices

Drug and chemical stock prices tumbled in London late last week when the British government decided to buy unlicensed drugs for use in hospitals. Within one day there was a 5.4% price drop on shares of one producer (Glaxo Laboratories).

The government's action is an attempt to cut the costs of its national health service program and to push down drug prices in general.

The new policy means that the Ministry of Health will buy prescription drugs without regard to whether they were produced or imported under any license or royalty agreement with British patent holders. As a first step, the Ministry is inviting bids for new supplies of tetracyclines, chloramphenicol (Chloromycetin) and chlorothiazides (Diuril).

Last year these three categories accounted for $2.8 million of the $38.4 million spent for hospital drugs. Any prospective supplier can enter the bidding, but it's expected that low bids will come from importers of unlicensed products.

The Assn. of the British Pharmaceutical Industry said it had "grave misgivings" that the new plan might discourage research expenditures, make it "impossible for the industry to maintain its international competitive position."

national roundup

Rounding out the week's domestic news.

Companies

Firestone Synthetic Fibers Co. (Akron, O.), subsidiary of Firestone Tire & Rubber Co., will become one of the three largest producers of lofted nylon filament next month when it starts production at its Hopewell, Va., plant. Firestone has bought the tradename Nyloft from Industrial Rayon Corp.; the fibers will be used for making rugs and carpeting. The company acquired the Hopewell site in '59 and has been producing filaments for tire cords there since the plant opened last year.

Honolulu Oil Corp. (San Francisco) has signed several agreements under which the company will sell all of its assets to Pan American Petroleum Corp., wholly owned subsidiary of Standard Oil Co. of Indiana, Tidewater Oil Co. and 10 other corporations. Honolulu expects to distribute about $100/share to stockholders when the company is dissolved late this summer.

Mineral Industries (Chicago) has acquired the trademark and inventories of Houston Chemical Corp.'s glycol antifreeze Peak and its companion methanol product Norway. Houston Chemical will become a basic producer of ethylene glycol late this year when its Beaumont, Tex., plant comes onstream; it will supply Mineral Industries' raw glycol requirements.

Expansion

Petrochemicals: Contracts have been awarded to three companies for construction at the proposed $50-million petrochemical complex to be started by Monochem Inc.—joint subsidiary of The Borden Co. (New York) and U.S. Rubber Co. (New York)—in Geismar, La., near Baton Rouge. United Engineers & Constructors (Philadelphia) will build a 150-million-lbs./year vinyl chloride monomer plant for Monochem, and a satellite plant to produce methanol and vinyl acetate for Borden. Chemical Construction Corp. (New York) will build for Monochem an 80-million-lbs./year acetylene plant, which will include an oxygen unit (capacity: 600 tons/day) to be built by American Air Liquide (New York). The entire complex is expected onstream by late '62. U.S. Rubber also plans satellite operations, but has not yet awarded contracts.

Hydrofluoric Acid: General Chemical Division of Allied Chemical Corp. (New York) will complete a 50% capacity expansion of the hydrofluoric acid unit at its North Claymont, Del., plant on July 1. The expansion, part of a five-year program that has more than doubled Allied's total HF output, is "geared to meet all atomic energy and industrial needs in the foreseeable future."

Potash: Northwest Co. Ltd. (Regina, Sask.), subsidiary of Imperial Oil Ltd. (Toronto), has taken out its first two potash exploration permits covering 200,000 acres in south central Saskatchewan. Potash in the area is believed to be at a depth of 5,000-6,000 ft.

Equipment: Linde Co. (New York), a division of Union Carbide Corp., plans a $2.5-million expansion and modernization project for its cryogenic-equipment plant in Tonawanda, N.Y. New facilities will expand the company's capacity for producing on-site oxygen, nitrogen and hydrogen plants. Completion target: next summer.

foreign roundup

Rounding out the week's international news.

Fertilizer/Australia: Gas & Fuel Corp. (Melbourne) and the Lurgi group of German companies are planning the expansion of the high-pressure gasification plant at Morwell, Victoria. The plant, situated in the world's largest brown coal field, will be enlarged to produce fertilizers and other by-products. Stauffer Chemical Co. also is expanding its heavy-chemicals manufacturing operations in Australia and will adapt its agricultural chemicals to local needs.

Research/India: Ciba is setting up the first chemical research center to be operated in India by a private company. It is expected to be completed in '63. The center will have separate departments for organic and physical chemistry, biochemistry, pharmacology, bacteriology and parasitology. A team of 24 Indians, now being selected, will be trained for work in the center's proposed project to develop new synthetic medicines.

Petrochemicals/Israel: Plans have been completed to construct a $3-million vinyl chloride monomer and polymer plant in the Haifa area, with the technical assistance of a not-yet-specified foreign company. Capacity of the plant, expected onstream in 18 months, will be 10-12 tons/day.

Aluminum/India: Montecatini S.p.A. (Milan, Italy) has signed an agreement with Madras Aluminum Co. of India for construction of a plant to produce 10,000 tons/year of aluminum ingots and alloys from Indian bauxite.

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IMCO CONTAINS THE BEST

Washington
Newsletter

CHEMICAL WEEK
May 27, 1961

The Administration proposals to tax earnings of overseas subsidiaries before they are "repatriated" are on next week's agenda of the House Ways & Means Committee. Today such profits aren't taxable by the U.S. until they are received by the U.S. Parent Corporation. So the profits become available for reinvestment abroad. The Administration contends that for balance of payment purposes it is now necessary for overseas profits to be taxed as they are earned.

Among CPI representatives who will testify beginning June 5: Dow Chemical Co., W. R. Grace & Co., Manufacturing Chemists' Assn. All told, some 50 nongovernment witnesses will be heard, and most will oppose the over-all Kennedy tax program.

Already, most witnesses have opposed the Administration's tax credit scheme for stimulating spending on capital plant and equipment. Most witnesses told the committee that—instead of the tax credit—the committee should take this opportunity to provide the stimulation by doing what needs doing most—liberalizing depreciation allowances.

Many witnesses suggested a larger initial allowance be taken the first year. Others said that if it could be done, the Canadian bracket system should be adopted. (This system permits the business man to select his own rate of depreciation, so long as he applies it consistently.) However, it appears that consideration of the Canadian bracket system will still await publication by the Treasury of its study on industry's actual depreciation practices—about which very little is known.

If a tax credit is the method to be adopted, many witnesses said, it should be an across-the-board credit—perhaps 7-10% of all spending on plant and equipment—instead of the Administration's scheme that benefits most those firms already spending more than their depreciation allowances.

The issue here: Will the committee deliberately decide to stimulate expansion and modernization of growth industries? This means—among other things—discriminating against other industries that may be their competitors.

•

Sen. Estes Kefauver will turn his attention back to drugs. Kefauver's Senate Antitrust and Monopoly Subcommittee is now wrapping up a series of hearings on price-fixing of electrical equipment. He hopes to begin hearings on his drug bill by the latter part of June.

However, it's most unlikely that Kefauver's drug measure will get out of committee this year. The bill is complicated, and hearings on it will likely continue off and on during the rest of the year. It would bring about changes in drug patent laws, alter Food & Drug Administration licensing requirements. Look for more talk about drug prices to come

Washington Newsletter

(Continued)

from the hearings; probably a partial rehash of last year's series, which was critical of the pharmaceutical industry.

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Kennedy's revised economic message will be optimistic. He is taking comfort in the various indexes of production, consumption, and employment. He feels that back in January he was right in concluding that the economy's downturn would shift upward by midyear. Now most of his advisors are giving added substance to that view.

Consequently, the Administration will continue a policy of aiding the areas of chronic depression, and the new area redevelopment act will contribute grants and loans to depressed areas for new industry, new public facilities. The Administration will refrain from any massive antirecession pump-priming program. Rather, new government expenditures will be aimed at missile and space development, where new projects in the area of vehicles and fuels will, it is hoped, provide new jobs, retraining of workers, and thus contribute to economic health.

Some government officials do not take such an optimistic view. Walter W. Heller, chairman of the Council of Economic Advisors, believes that even 18 months from now the unemployment rate won't be down to 4%. He and Secy. of Labor Arthur Goldberg wonder whether there should be a pump-priming government spending program as a remedy.

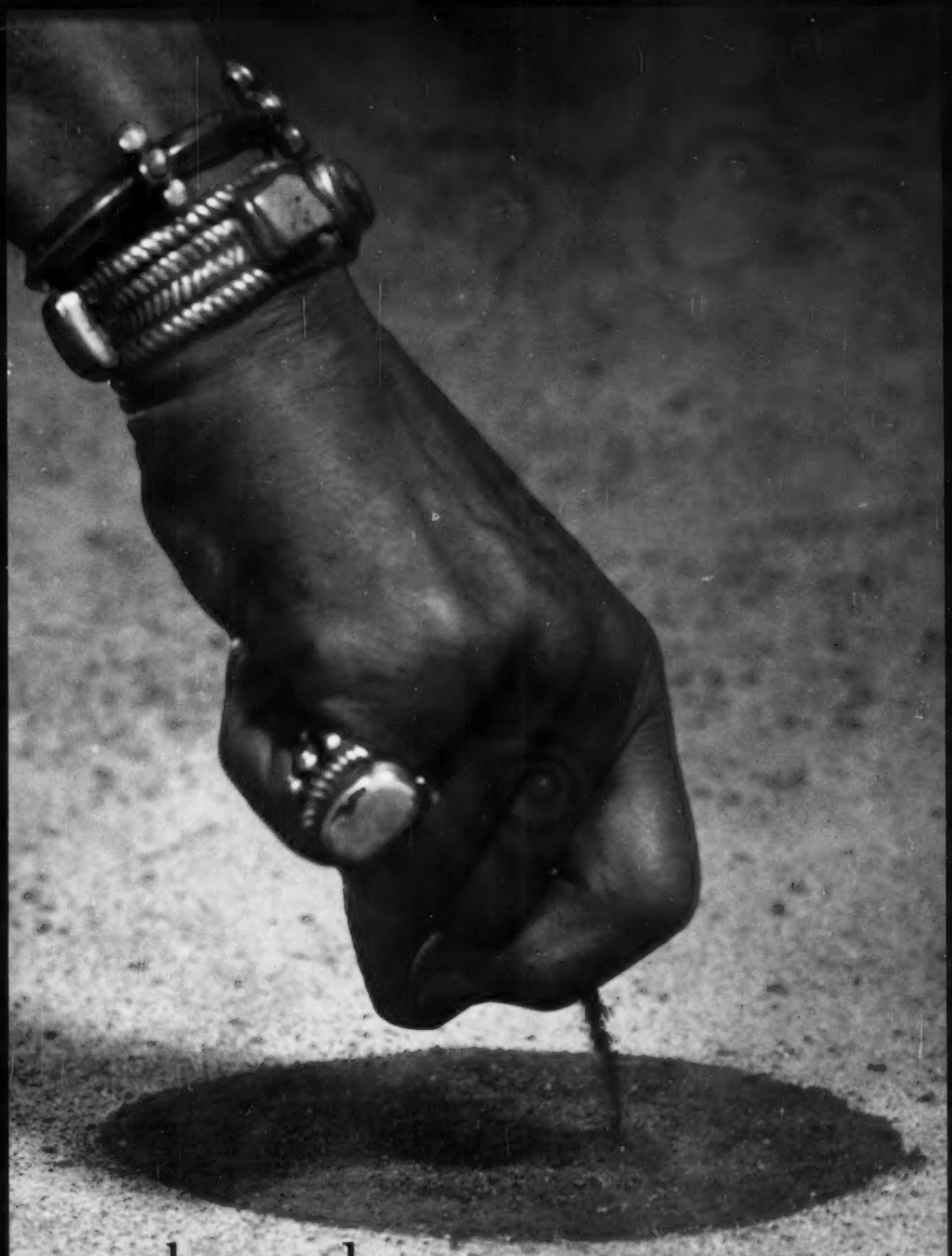
But Kennedy is sticking with the advice of Treasury Secy. Dillon and Commerce Secy. Hodges, who see a good upturn coming. Indeed, Dillon is talking on the line that business is becoming robust, and that tax revenues may permit a reduction in personal income taxes next year.

Republican economists too are beginning to see signs of recovery so strong that inflation could become a problem. Arthur Burns, who was chairman of Eisenhower's Council of Economic Advisors, has support from Republicans on the Congressional Joint Economic Committee. Their combined view, in the words of the Republican committee members: "It would be courting inflation to . . . plan new spending programs that would mature when the economy was already advancing without them."

•

Boron fuels may return to favor. They would be intended for rocket engines used to put satellites into orbit, however. Use of boron fuel for air-breathing engines has been pretty much shelved.

The Air Force is currently doing experimental work with engines burning boron fuel at Edwards Air Force Base in California. It is aimed at using the fuel to power upper stages of rockets such as the Agena series used to put the Air Force's Discoverer, Samos and Midas satellites into orbit. Air Force engineers are mixed in their evaluation of the boron-fueled rockets. Some want to push the program hard, others want more testing done first. A decision is due by July 1. Right now limited amounts of pentaborane are being produced by Callery Chemical at Muskogee, Okla.



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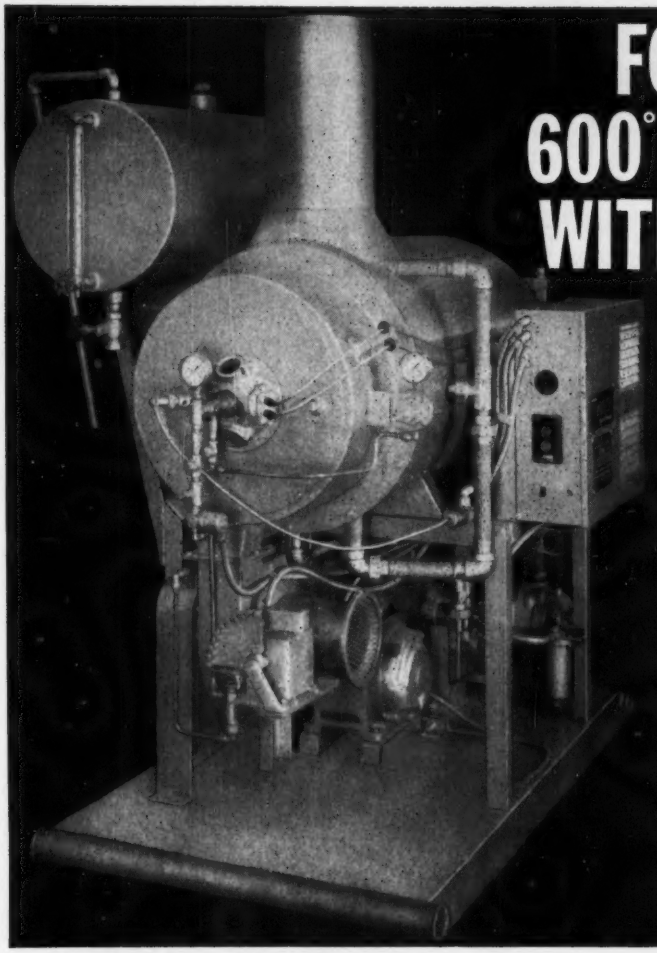

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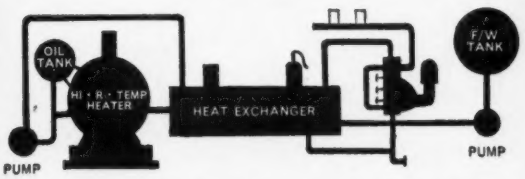

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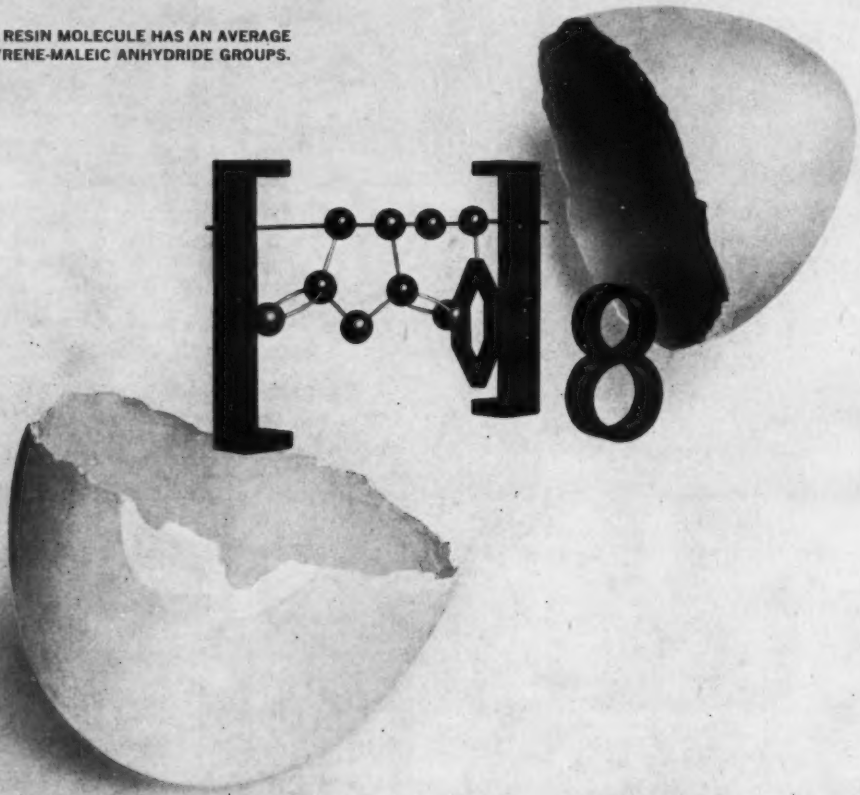

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Why Executives Read the Want Ads

Scarcity of 'room at the top' heads the list of complaints of job-seekers. Salary, transfers, budget cuts, figure too.

When chemical process plant executives start looking for better jobs, it's usually because they feel thwarted in their present occupations. That's a highlight of the survey just completed for CHEMICAL WEEK by Heidrick & Struggles, Chicago- and Los Angeles-based executive recruiting firm —and it's just one of several such findings that management might consider in efforts to keep top talent happy.

H&S, which examined about 600 cases in its files, was able to compare the background and complaints of disgruntled CPI men with those of job-hunters in other fields. The typical man from the chemical and allied products field (e.g., soaps, cosmetics, plastics)—about 10% of the examples studied—has much in common with his counterpart in other fields. He usually has a superior educational background (compared with the general example of job-hunter), and the percentage of these men in marketing positions is a trifle higher—otherwise, he's not untypical.

Profile: The average CPI executive has a graduate degree or two, although some, of course, have no academic degrees at all. He is 35 to 45 years old (the range is wider in "all industry") and generally holds a position in the marketing department. Next most frequent jobs for CPI applicants: general administration, engineering and personnel work, in that order. In all industry, excluding the CPI, the job-seekers are most plentiful in general administration, marketing, engineering, manufacturing, finance and personnel, in that order. The CPI job-seeker is also more likely to be still employed while registering with the recruiting agency.

The annual salary of most job-seekers is about $20,000 according to

H&S, although the salary range for CPI clients was $15,000-50,000. Most applicants also received generous fringe benefits—e.g., a bonus is usually given in addition to salary. Other benefits reported by all applicants include stock options (not necessarily profitable, since some stock prices have slipped below option-buying levels), club memberships, use of company automobiles, profit sharing or deferred compensation, and commissions.

Why Quit? The reasons job applicants in all specialties give for leaving fit one or more of these categories, according to H&S: they feel they have a limited or zero chance of future advances; that merger or consolidation has eliminated need for their positions; that there is conflict of personalities; that compensation is too low; that they must travel excessively or that living conditions are bad. Of course, some are directly requested to find new jobs. Still others are not ready for the retirement that will ultimately be forced on them.

About 54% of non-CPI and 59% of CPI executives say that a "limited or nonexistent future" in their present positions is their principal reason for wanting to leave. H&S Vice-President John S. Wilson explains that this frequently means "that an executive feels he has been pigeonholed with no advancement opportunity, or that nepotism prevails, blocking positions above him."

Shuffling personnel from one plant to another often causes disgruntlement.

In some cases, says Wilson, "his position may have been changed in nature and no longer meets his desires for authority, responsibility, recognition, change or challenge." Item: While very few men surveyed say they are disgruntled over salary, Wilson is personally convinced that compensation is the biggest single element in the "limited or no future" reason given for leaving.

Vote of No Confidence: But in the cases of privately owned companies, lack of confidence in top management's desire to build the organization is apparently a common problem. Says Wilson, some unhappy executives feel that the presidents and chairmen of their firms are happy and comfortable with the way things are going and don't want to create more problems by taking the risks that go with expansion. As one man explained it, "My company isn't going anywhere, and if not, I'm not going anywhere either."

Another, a $70,000/year (total income) research vice-president, left his company because of dissatisfaction with the size of the budget given him to explore new products.

Typical quotes from other H&S clients: "Management reneged on a promise in cutting my budget' (marketing director of a large Eastern chemical company); "I don't think management is willing to take risks any more" (engineering director); "My company has cut its research and capital improvements budget and gives the appearance of wanting to become a holding company" (director of manufacturing); "Management is just too darned conservative"; discussing a predecessor, "They fired him after 24 years. What are they going to do with me when I'm 50?" (vice-president of a chemical construction firm).

Merger Conflict: A superintendent of engineering and maintenance, who wanted to leave because of conflict with new management resulting from a merger, complained: "My new boss doesn't have any confidence in me—my old management had confidence in me for 25 years."

An outstanding petroleum chemist said, "The only reason they have research at my firm is for stockholder relations." In the same company, a research group leader observed, "I can give a $1,500 raise to one of my section leaders, but can't get one for myself."

Personality conflicts with the boss may be more frequent than reported.

Wilson notes that this man was nearly at the top of his salary bracket, but management apparently didn't do a very good job of explaining the situation. Conversely, he cites the case of a man at a different company's branch plant who had the authority to make a $20,000 process decision but couldn't give any of his underlings a raise because of being "second-guessed by somebody else at headquarters."

Mergers are also forcing men out of businesses or industries where they thought they had a future. Wilson predicts: "If the merger trend continues, entire industries may find executive-type men looking more kindly toward other less merger-minded industries."

Personality conflicts—third most important reason given for leaving—are given only hesitantly by most men. They feel it might imply that they are hard to get along with, in Wilson's opinion, so he believes that more than the 7% who listed this as a reason actually should have done so.

Soothing Sore Spots: In the case of CPI executives, Wilson thinks there are two areas in which management can profit by observing positions within the company from the employee viewpoint as well as from the management viewpoint: (1) the effects of frequently transferring employees from one plant or one city to another; (2) the effects of budget cuts on employ-

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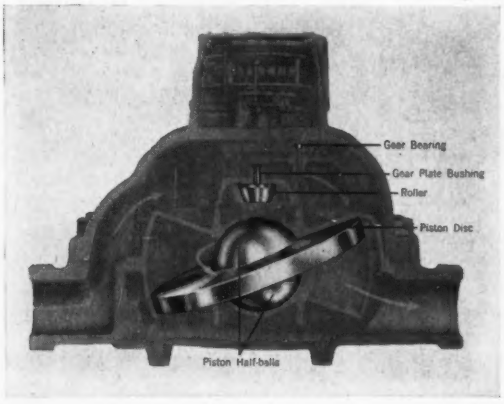

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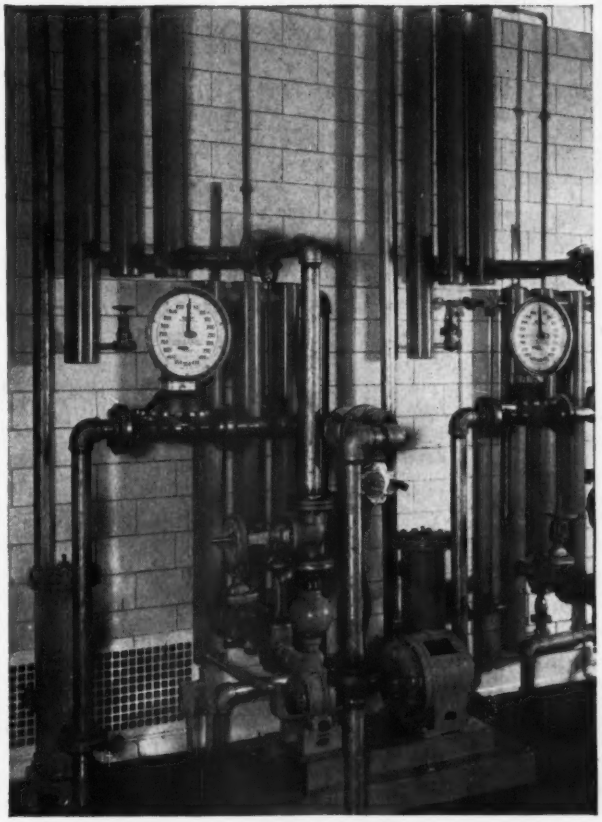
Other characteristics of KEL-F Plastic—It performs through an unusually wide temperature range . . .



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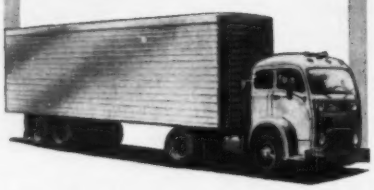

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ees, particularly those in research.

He observes that many executives do not understand why their future depends on their being transferred all over the country, often the case in a multiplant organization. In some cases, it works a hardship on them to be uprooted constantly—financially and otherwise. (Old saying: "Three moves are as bad as a fire.") Some men have deep roots in certain communities, where their names mean something.

"It's not so much a matter of telling management how to run its business," Wilson says, "as it is of the employees knowing why they must be shuffled around in order to get to be an officer of the company."

Some companies may not comprehend how serious the effects of a budget cutback can be on employees —not so much from the standpoint of elimination of jobs as the idea that management doesn't have faith in what the employees are doing. This in turn causes lack of confidence in the management. Wilson, who has placed many chemical researchers, says this is especially important in research departments. "Research people are very literal and they sometimes regard promises as sacred," he says. "Maybe management doesn't care about the implications of its actions in some cases, but I know their decisions can come back to haunt them."

One consolation job hunters can savor is that, for the chemical industry as a whole, there is an increasing demand for management personnel as opposed to less-skilled workers (*CW, May 20, p. 21*). Although the chemical industry accounted for only 1.2% of the 921,000 decrease in hourly paid employees during the period April '60 to last month it welcomed 59.4% of the 17,000 increase in salaried employees during the same period. Only 6% of the nation's work force is employed in chemicals and allied products.

Few of the many professional recruiting organizations are likely to dispute H&S's fundamental conclusion: "Listening as well as talking to management executives might clear up many misunderstandings and eliminate dissatisfactions on the part of key people. Qualified executives are too hard to find to be allowed to leave an organization without every effort being made to retain them through a continuing program."

LEGAL

'Fair Trade' Plea: Olin Mathieson Chemical Co. has petitioned the eighth U. S. district court of appeals at Cleveland to enforce Ohio's "fair trade" law. The state law has been declared unconstitutional by common pleas courts in Cleveland, Columbus and Cincinnati.

•

Hazard: The Chicago Board of Health has closed Volk Radiochemical's plant, reporting it found dangerously high amounts of radioactivity in the company's halls and main offices. Board of Health Commissioner Samuel L. Andelman said the radiation was not dangerous to passersby. He said Volk plans to move to a new plant in suburban Skokie soon.

LABOR

Pacts: The first contract between Allied Chemical Corp.'s Plastics Division Laboratory (Tonawanda, N.Y.) and OCAW Local 15-623 has been ratified by union members. The two-year contract includes an automatic progression schedule, along with immediate wage increases averaging 18¢/hour. Automatic progression increases average 3¢/hour (bringing the total to 21¢/hour) the first year and 8¢/hour the second year.

• Seiberling Rubber Co. and United Rubber Workers have signed a two-year agreement covering 1,225 employees at Barberton and Carey, O., plants. The new pact provides for wage increases of up to 14¢/hour over the two-year period and an additional paid holiday.

•

Allied Strike: Some 335 maintenance and production workers have struck at National Aniline Division (Hopewell, Va.) of Allied Chemical Corp. The strikers, members of five AFL-CIO affiliated unions, had been operating on an extension of an expired contract. The unions involved are locals of International Chemical Workers (the largest group); International Brotherhood of Electrical Workers; International Assn. of Machinists; United Assn. of Journeymen and Apprentices, Pipefitting and Plumbing Industry; and International Assn. of Heat and Frost Insulators and Asbestos Workers. The company's new contract offer included a 3% gen-

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eral wage increase and "substantial improvements in fringe benefits"; The union has not made public its demands, although it accepted the UCC proposal. The present hourly wage scale ranges from $1.86 to $3.08.

•

Pay Hike: A two-year pact between United Mine Workers Local 13091 and the U.S. Stoneware Co. in Tallmadge, O., grants 125 employees a 7¢/hour increase the first year and 8¢/hour the second year.

KEY CHANGES

Lincoln L. Redshaw to president, U B S Chemical Corp. (Cambridge, Mass.), division of A. E. Staley Manufacturing Co.

Howard Shannon to vice-president, Amerace Corp. (New York).

Richard I. Goodkind to executive vice-president and member of the board of directors; **Robert W. Romer** to financial vice-president and secretary, Tennessee Products & Chemical Corp. (Nashville).

David Gregg, Jr., to the board of directors, Shulton, Inc. (Clifton, N.J.).

Thomas J. Payne to vice-president, J. Bishop & Co. (Malvern, Pa.).

Hein I. Koolsbergen to president; **H. E. Linden** to chairman of the executive committee; **Nathan W. Levin** to vice-chairman of the board, The Oil Shale Corp. (New York).

Loyd A. Amos and **Alanson L. Brooks** to vice-presidents; **William Hobbs** to treasurer, Kaiser Aluminum & Chemical Corp. (Oakland, Calif.).

John C. Russell and **Roman Chelminski** admitted to partnership, Singmaster & Breyer (New York), chemical process and metallurgical engineering firm.

Fred R. Ellenberger to vice-president, Worthington Corp. (Harrison, N.J.).

Robert P. Parker to general manager, Lederle Laboratories Division; **Thomas P. Turchan** to general manager, Organic Chemicals Division; and **Jerrold H. Ruskin** to general manager, Industrial Chemicals Division, American Cyanamid Co. (New York).

Cyril S. Kimball to president, Foster D. Snell, Inc. (New York).

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Vegetable Starch	4.0
UNION CARBIDE LE-46 Silicone (35% Silicone)	0.7
SAG 470 Silicone Antifoam	0.5
Methyl "Parasept"	0.17
Propyl "Parasept"	0.03
Tergitol NPX	0.1
Distilled Water	94.5
Perfume	q.s

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Target: More Versatile Fuel Cells

Who's Working on Regenerative Fuel Cells

Company	*Fuel*	*Oxidizer*	*Product*	*Energy Source*	*Status*
American Machine & Foundry (Springdale, Conn.)	Hydrogen	Oxygen	Water	Electricity	**Membrane electrolyte; bench scale; no devices**
Electric Storage Battery Co. (Philadelphia)		Oxygen	Zinc oxide	Electricity	**For fork-lift truck power; prototype demonstrated**
Electro-Optical Systems (Pasadena, Calif.)	Hydrogen	Oxygen	Water	Electricity	**Experimental model tested**
	Concentrated sulfuric acid	—	Dilute sulfuric acid	Heat or evaporation	**Concentration cell rather than oxidation type; laboratory model tested**
General Electric, Missile & Space Vehicle Dept. (Philadelphia)	Hydrogen	Oxygen	Water	Solar electricity	**Prototype tested in space**
General Motors, Allison Division (Indianapolis)	(Molten metal system)			Nuclear heat	**Prototype continuously operated for 1 hour**
Hoffman Electronics (Los Angeles)	Alkali metal	Halogen	A salt	Electricity	**Experimental model tested**
Ionics, Inc. (Cambridge, Mass.)	Hydrogen	Air and bromine	Water and hydrogen bromide	Electricity	**Experimental model tested**
Lockheed Aircraft (Sunnyvale, Calif.)	Organic dye	Metal ions (reducing agent)	Reduced dye	Solar photochemical action	**Studying reactions**
	Cadmium or lead	Halogens	Cadmium or lead iodide; lead bromide	Solar heat	**Studying reactions**
MSA Research Corp. (Callery, Pa.)	Lithium	Hydrogen	Lithium hydride	Nuclear heat	**Prototype being tested**
Pratt & Whitney Aircraft Division, United Aircraft (East Hartford, Conn.)	Hydrogen	Oxygen	Water	Electricity	**Developing 500-watt storage system based on Bacon-type fuel cell**
Sundstrand Turbo Division, Sundstrand Machine Tool Co. (Pacoima, Calif.)	Nitric oxide	Chlorine	Nitrosyl chloride	Solar photochemical action	**Experimental model assembled**
Thompson Ramo Wooldridge (Cleveland)	Lithium	Hydrogen	Lithium hydride	Nuclear heat	**Prototype being tested**

At least a dozen companies (*table, left*) are today working in a special phase of fuel cell research—that concerned with regenerative cells, in which the chemical reactants can be regenerated and used again. For example, six of the dozen or so papers on fuel cells given at the Power Sources Conference two weeks ago at Atlantic City were concerned with such cells.

All three of the armed services are sponsoring work on regenerative systems (the Atlantic City meeting was sponsored by the Army Signal Research and Development Laboratory) and each is doing some research internally. An estimated $1 million in Defense Dept. contracts have been let on the regenerative fuel cell work. Moreover, the National Aeronautics & Space Administration has recently begun work in this area. Proprietary work is also being done by most of the companies.

Target of this broadside: versatility—to permit fuel cells not only to convert chemical energy into electrical energy but also, by application of electrical, thermal or photochemical energy, to do a couple of other jobs. One is to reverse the process and store electrical energy; another function is to convert nonchemical energy into electrical energy. Conversion of nuclear heat to electricity, for instance, is one big goal of this work. And storage of solar energy (generally first changed into electricity by solar cells) is another target, especially for space uses.

When used for nonchemical energy conversion, the cells can be regenerated continuously, while their use as storage devices would probably require a conventional discharge-recharge cycle. Conversion devices with power-to-weight ratios of up to 10 watts/lb. are foreseen; and there is high hope for storage devices with capacities higher than nickel-cadmium's 12 watt-hours/lb.

Electrolytic Systems: The hydrogen-oxygen system, long studied as a primary fuel cell, is also getting close attention for regenerative use in storage devices. The two gases are regenerated simply by electrolyzing

the water formed. Pratt & Whitney Aircraft Division of United Aircraft, for instance, is designing a solar-regenerative power supply system based on the Bacon fuel cell, on which the British began work in the early '30s (*CW, July 30, '60, p. 28*). A 500-watt system being designed for the Army has a number of modifications to minimize weight and allow operation in the absence of gravity.

General Electric Co.'s ion-exchange membrane cell is also being adapted for use as a regenerative cell. Researchers working on this project in GE's Missile & Space Vehicle Dept. and Research Laboratory reported at Atlantic City on improvements that allow the electrolysis reaction to take place in the same area used for the fuel cell reaction. (Previously the membrane used would not stand up under the conditions of the regeneration process.) Last October, a GE cell was among the instruments fired aloft by an Atlas missile. The "zero gravity" test showed no malfunctioning of the cell.

Another design of a hydrogen-oxygen regenerative cell is proposed by Electro-Optical Systems, Inc. Instead of a membrane electrolyte (like GE's) or a separate electrolyzer (like P&WA's), the Electro-Optical cell uses a liquid electrolyte in porous asbestos, carries out the electrolysis in the same chamber. Gas storage is also within the chamber, with both gases being stored in their respective electrodes (made of sintered nickel) and excess oxygen being stored in the asbestos. EOS is aiming at cells that retain 15 watt-hours/lb. after 5,000 hours of use (against 1-5 watt-hours/lb. for nickel-cadmium batteries at the same stage).

American Machine & Foundry's Research & Development Division is also looking at hydrogen-oxygen fuel cells—both primary and regenerative—that use an ion-exchange membrane. Laboratory work is under way, but no devices have been built.

Halogen-Users: Other cells that can be regenerated electrolytically are based on halogen oxidants. Ionics, Inc., has a membrane cell that uses a bromine-bromide solution as an intermediate oxidant system between hydrogen and air. Bromine reacts with hydrogen to give hydrogen bromide, which in turn reacts with air to yield water and regenerated bromine.

Bromine is also used by Hoffman Electronics to oxidize sodium in a cell that can be regenerated by the output from solar cells. Recent work reported at the Power Sources Conference deals with primary cells using sodium amalgam as the fuel and chlorine as the oxidant, while earlier efforts were aimed at the bromine-using regenerative system. Goal of new work is to make a regenerative unit with twice the capacity of a nickel-cadmium battery at half the cost.

Lockheed Aircraft has studied a solar-heat regenerative system using cadmium iodide or lead iodide or bromide. A mercury-bromine cell was found impractical.

Another halogen cell is a silver iodide unit being studied by GE. It can be regenerated by the sun through either thermal or photochemical means.

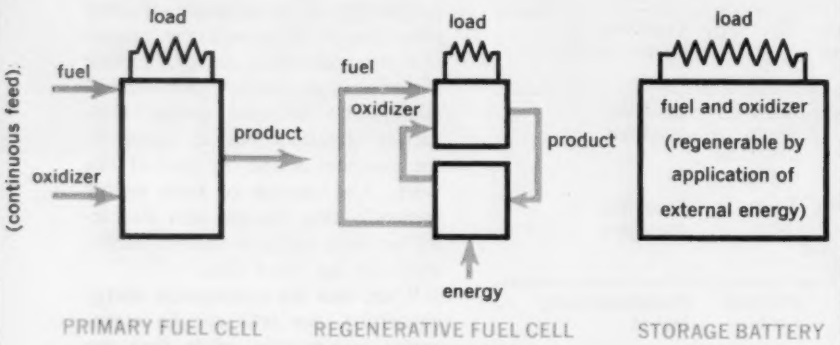
Photochemical Approach: Photochemical regeneration is being tried in a number of other systems, but results so far show only low conversion efficiencies (below the 12-15% that the best silicon cells can achieve). Lockheed is looking at an organic dye system using metal ions to reduce the dye, sunlight to regenerate it by oxidation. Proflavine mixed with ascorbic acid is one of the dyes tested. Efficiency is strongly affected by pH and dye concentration; and stability of the solution is a problem.

A nitrosyl chloride cell is under development at Sundstrand Machine Tool Co.'s Turbo Division. Sunlight dissociates the chloride, yielding nitric oxide and chlorine, which produces electricity when recombined. Separation of the products prior to recombination has been a problem. Results are encouraging enough, however, that the company believes a 500-watt flight system weighing about 100 lbs. could be built.

Other photochemical systems include two studied by Electro-Optical: sulfur trioxide to sulfur dioxide and oxygen; and water to hydrogen peroxide on a porous electrode containing zinc oxide.

Nuclear Hopefuls: In its quest for cells that can put nuclear heat to work, MSA Research Corp. has been studying a lithium hydride system for several years, is now at the stage of testing it in a reactor. Finding a suit-

DIMENSION



Is It a Fuel Cell or a Battery?

Regenerative fuel cells (*diagram, above*) are, roughly speaking, a compromise between storage batteries and regular fuel cells (called "primary" because they produce electricity directly from continuously supplied chemicals without involving any other energy source). In principle, the regenerative fuel cell is the same as a battery, since the original fuel and oxidizer are regenerated by application of outside energy (comparable to recharging a battery). However, the regenerative type also retains some of the primary cell's characteristics, including one or more of these: at least one reactant is often a gas; fuel is generally stored outside the conversion unit; and continuous regeneration can allow steady flow of reactants. Regeneration can be by thermal, electric or photochemical energy, depending on the system. Nuclear heat and solar energy (both photochemical and solar-cell electrical) are the most-studied sources.

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able solvent has been a problem, and improved catalysts are still sought.

Thompson Ramo Wooldridge Inc. is also working on the lithium hydride cell, and is developing a completely regenerative system for the Air Force. A new type of hydrogen electrode is being studied by the firm.

Another type of cell aimed at nuclear applications is a "liquid metal" type designed by Allison Division of General Motors. Presumably a mixture of metals could be used as coolant for a reactor and could also be the basis of the fuel cell. While being heated, the metals would separate by distillation; their recombination (apparently an intermetallic mixture) generates the current. Further disclosure of the system is expected in the fall.

Other Entries: Although not always classed with the regenerative fuel cells (definitions of the field are still somewhat hazy), two other systems might be listed with them.

One is the zinc-oxygen cell developed by Electric Storage Battery Co., primarily for use in fork-lift trucks. It's rechargeable, like a battery. The firm has demonstrated a working unit based on the cell, says it foresees mass production within a few years.

Another type is Electro-Optical's sulfuric acid concentration cell. Rather than using a fuel and oxidizer, it is based on the current generated between concentrated and dilute solutions of sulfuric acid. The dilute solution is formed by an electrode reaction with either hydrogen or oxygen, yielding water. Evaporation of the water reconcentrates the acid, and the gas is regenerated at the other electrode. Hydrogen gives better theoretical results, but tends to oxidize in hot, concentrated sulfuric acid.

The redox cell is another type of fuel cell that involves regeneration. The aim of the redox system is conversion of carbonaceous fuel energy into electricity through intermediate electrode reactions of materials that can be regenerated chemically. Progress in this area has been slow, however.

While most of these systems are clearly still in the early research stage, it may not be long before some find jobs in space uses, nuclear reactors or other applications that require specialized performance.

EXPANSION

• Arthur D. Little, Inc. (Cambridge, Mass.), has expanded its research information services to include the minerals industry; services consist of field consultations with clients and industry-wide quarterly reports.

• Quantum, Inc. (Wallingford, Conn.), has established a nuclear research division at Western New York Nuclear Research Center on the campus of the University of Buffalo. Studies will include radioactive tracer techniques, radiation effects on materials, radiation chemistry, and activation analysis.

• A. E. Staley Mfg. Co. has dedicated its new, 108,000-sq.ft. Staley Research Center at Decatur, Ill. Among the types of work to be done: product development studies based on the firm's recently developed process for separating amylose from mixed starches.

• North American Aviation has added an electrophysical laboratory to its Space and Information Systems Division at Downey, Calif. Advanced research in electronic emission will be carried out.

• Development and manufacture of electro-optical and infrared equipment is the work of newly organized Measurement Systems, Inc. (53 Water St., South Norwalk, Conn.).

• The Bendix Corp. will build a Cryogenics Development Laboratory at Davenport, Ia. It will be operated in conjunction with an 18-year-old liquid-oxygen research facility at the same location.

• Kennecott Copper Corp. plans a new basic research program on solid-state physics of metals; it will be headed by Ewan Fletcher.

• New laboratory, manufacturing and administration buildings were recently dedicated at Fort Worth by Alcon Laboratories, pharmaceutical firm specializing in eye, ear, nose and throat preparations.

• The Camille Dreyfus Laboratory, a fundamental polymer research lab now under construction at the Research Triangle Institute (Durham, N.C.), will be under direction of Anton Peterlin, currently head of the Physics Institute at the Technische Hochschule in Munich, Germany. The first 20,000-sq.ft. section of the laboratory will be completed by late summer.

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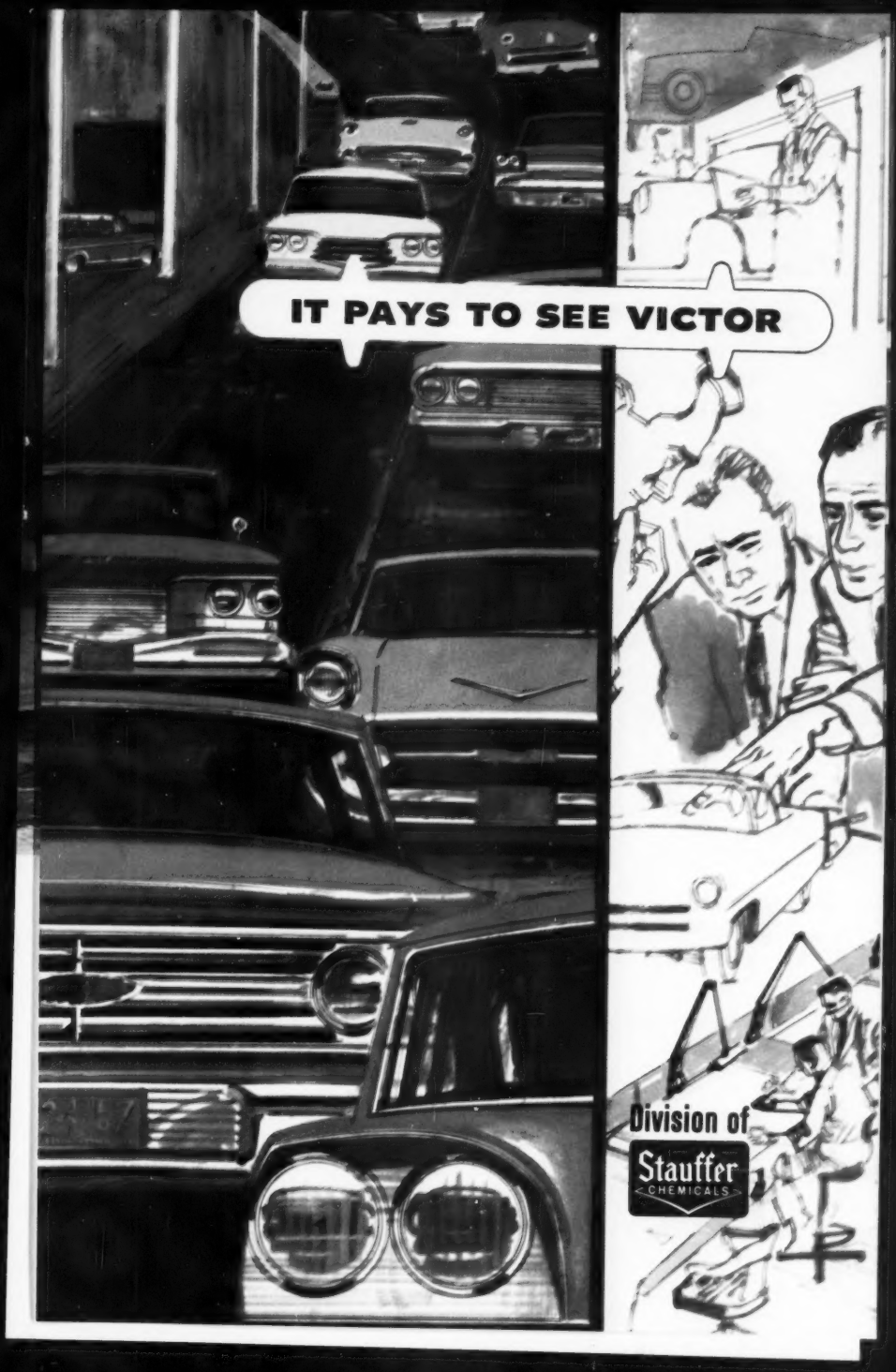
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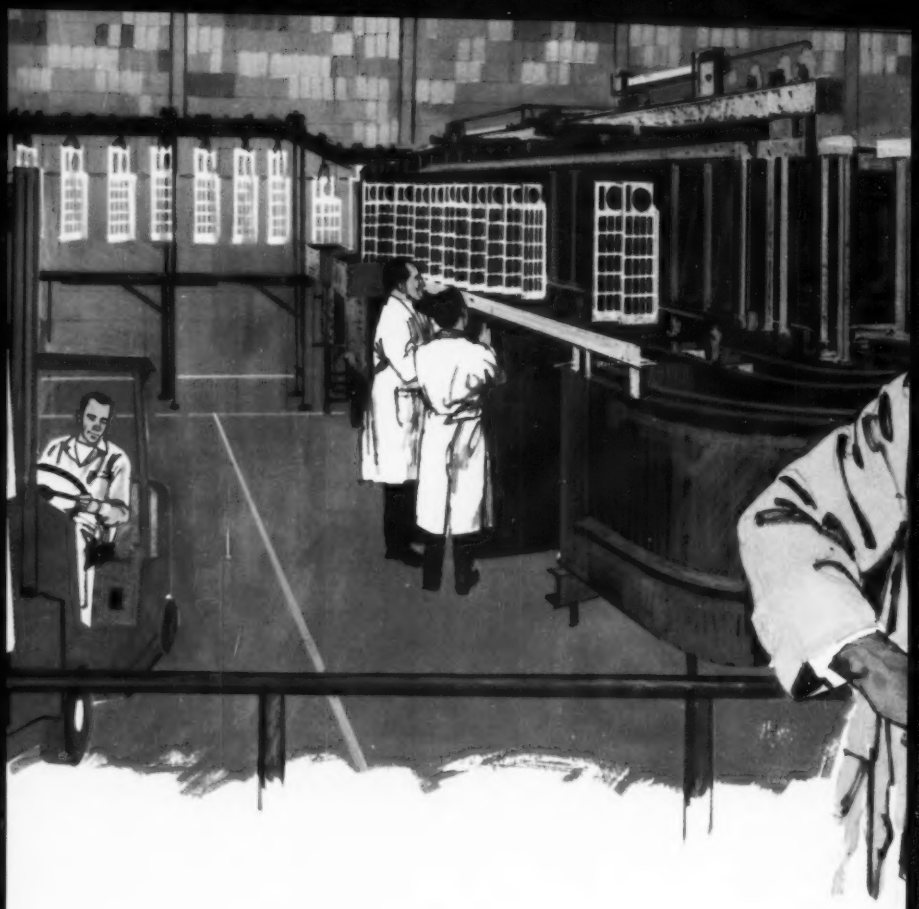

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Finishes are fast *two* ways when Victor *phosphoric acid* is part of the production process. In just seconds, aluminum grilles gleam bright . . . stay light.

Modern methods of chemical electropolishing work wonders on other popular metals too, stainless steel and copper. Unlike mechanical buffing, intricate shapes and extrusions pose no problems.

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Even before the last train has been posted, station clean up crews take over. It's then that the value of Victor *trisodium phosphate* in soaps and detergents stands out.

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Tetrapotassium makes a two point touch down

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- ☐ Information on phosphates used in metal finishing.
- ☐ Phosphatization of Ferrous Metals (a Bibliography 1953-1960)
- ☐ Handling and Storage of Phosphoric Acid
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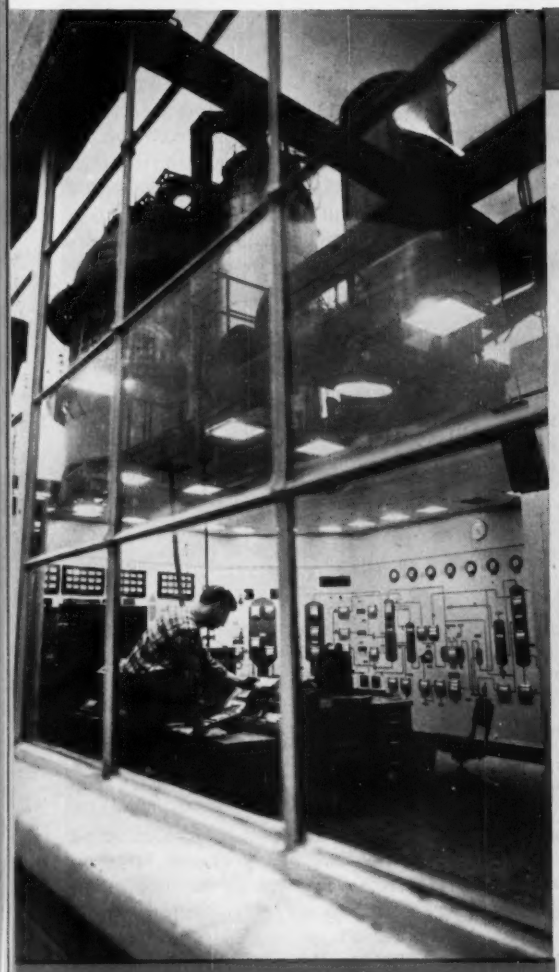


Cracker at Standard Oil's (Calif.) El Segundo refinery is mirrored in window of control room which will soon house new custom-built computer controlling cracking process.

Processes Move Under Digital Computer Control

Company	Computer	Application
B. F. Goodrich Chemical Calvert City, Ky.	RW-300	Vinyl chloride monomer and acrylonitrile
Celanese Bishop, Tex.	RW-300	Hydrocarbon oxidation
Dow Chemical Midland, Mich.	GE-312	Styrene from ethylbenzene
Du Pont Beaumont, Tex. Gibbstown, N. J. Orange, Tex.	— IBM 1720* Panellit 609	Caprolactam Acrylonitrile pilot plant —
Esso Research & Engrg.-Consolidated Electrodynamics Pasadena, Calif.	LGP-30	Catalysis pilot plant
Gulf Oil Philadelphia	RW-300	Catalytic cracker
Monsanto Chemical Luling, La.	RW-300	Ammonia
Potlatch Forests, Inc. Lewiston, Ida.	IBM 1710	Paperboard plant
Standard Oil (Calif.) El Segundo, Calif. Richmond, Calif.	IBM custom IBM 1720	Catalytic cracker Fluid catalytic cracker
Standard Oil (Ind.) Whiting, Ind.	IBM 1720	Pipe still
Sun Oil Marcus Hook, Pa.	OPCON Litton 80	Fractionating column Refinery optimization
Tennessee Eastman Kingsport, Tenn.	GE 312	New process
Texas Co. Port Arthur, Tex.	RW-300	Catalytic polymerization
Union Carbide Olefins Seadrift, Tex. Seadrift, Tex. South Charleston, W. Va.	RW-300 Daystrom RW-300	Ethylene oxide Ethylene oxide Ethylene oxide pilot plant
Universal Oil Products Des Plaines, Ill.	Daystrom	Molex pilot plant

*Installation is scheduled for '62. The two oil company 1720s will be delivered later this year.

Fleshing Out Automation's Roster

Computerized control is racing ahead: new automated processes; new supplier tie-ups; new confidence in the payoff.

A surge of new developments highlights some emerging trends and conclusions in the fast-paced field of computer-controlled chemical processing.

The news:

• The first custom-built IBM digital computer is now being completed and will soon control a Standard Oil (California) catalytic cracking unit at El Segundo, Calif. (*see picture above*).

• Come September, an IBM 1710 will control one of two 250-tons/day paperboard machines at Potlatch Forests, Inc. (Lewiston, Ida.) (*CW, May 20, p. 65*). This marks the first paper machine under computer control.

• Two more CM-3 analog computers, put out by Dresser Electronics, SIE Division (Houston, Tex.), will start operating by June. One will control a butadiene unit in Italy for Technica per l'Automazione Industriale. The other will be applied to a stripper column at Texas City Refining, Inc. (Texas City, Tex.).

• Monsanto is planning computer control of four process units at its now-being-built Chocolate Bayou, La., complex—the first plant designed from scratch for computer control. All indications are that a digital com-

puter will get the nod. Informed sources say that IBM and Daystrom want the job; speculation is that Daystrom may have sewed it up.

• TRW Computers Co. (Los Angeles), which makes the RW-300, and Swartwout Division of Crane Co. (Chicago), instrumentation manufacturer, have just entered into an agreement to develop and market complete automatic control systems.

• Another agreement of mutual support in engineering and marketing was reached by Allis-Chalmers Mfg. Co. (Milwaukee), Consolidated Systems Corp. (Monrovia, Calif.), which A-C partly owns, and IBM.

Running the Cats: Both Standard Oil (California) and Gulf Oil Corp. (Pittsburgh) have chosen digital computers to run catalytic crackers. The 60,000-bbls./day unit at Gulf's Philadelphia refinery is operated by an RW-300 (*CW, Jan. 21, p. 58*). And the 40,000-bbls./day Standard Oil cracker will soon be controlled by a custom-designed, one-of-a-kind IBM computer. It is now tied to an IBM 7090 (*CW, Dec. 10, '60, p. 81*).

This 7090, located in San Francisco, performs a Herculean task. Via leased telephone lines, Standard Oil has linked it to two development laboratories (at La Habra and Richmond, Calif.) and to three refineries (at El Segundo and Richmond, Calif., and Perth Amboy, N.J.). Eventually, 35 operating divisions may be hooked on.

The huge digital computer receives cat cracker signals as often as every 72 seconds. Still a total of only 1-2% of its time is spent with the El Segundo cracker. The 7090's job, in this case, is to generate data and know-how for the custom computer.

The new computer will devote full time to manipulating the 75 variables that define cracker operation. Although the computer can scan 20 points per second, it will view the variables at a rate of 40/minute. From information thus gathered, the computer will learn the operating condition of the unit. This will be compared with the optimum derived from a linear programming technique (*CW, Feb. 25, p. 67*). Then, every 15-20 minutes, a new set of conditions will be typed out for the operators to follow.

The hardware itself is probably similar to the new 1710 (*CW, March 18, p. 60*) and the 1720, soon coming out. Prices, however, may differ. The 1710 sells for $111,000 and the new one is likely to be two-three times as expensive.

Paper Breakthrough: The paper industry has spent years and a large proportion of research dollars in an attempt to produce uniform products and minimize waste. The Potlatch Forests-IBM development is the first solid breakthrough.

Just how the specially-tailored IBM 1710 will take control of the 500-ft. paper machine is now being determined. Two hundred instrument signals will be fed into the computer. A program in the computer's memory will digest this data, determine the state of the system and changes needed to optimize it. Process adjustments will be made manually.

The Potlatch project is the first product of a paper control pilot plant normally set up by IBM just three months ago (*CW, Feb. 18, p. 91*).

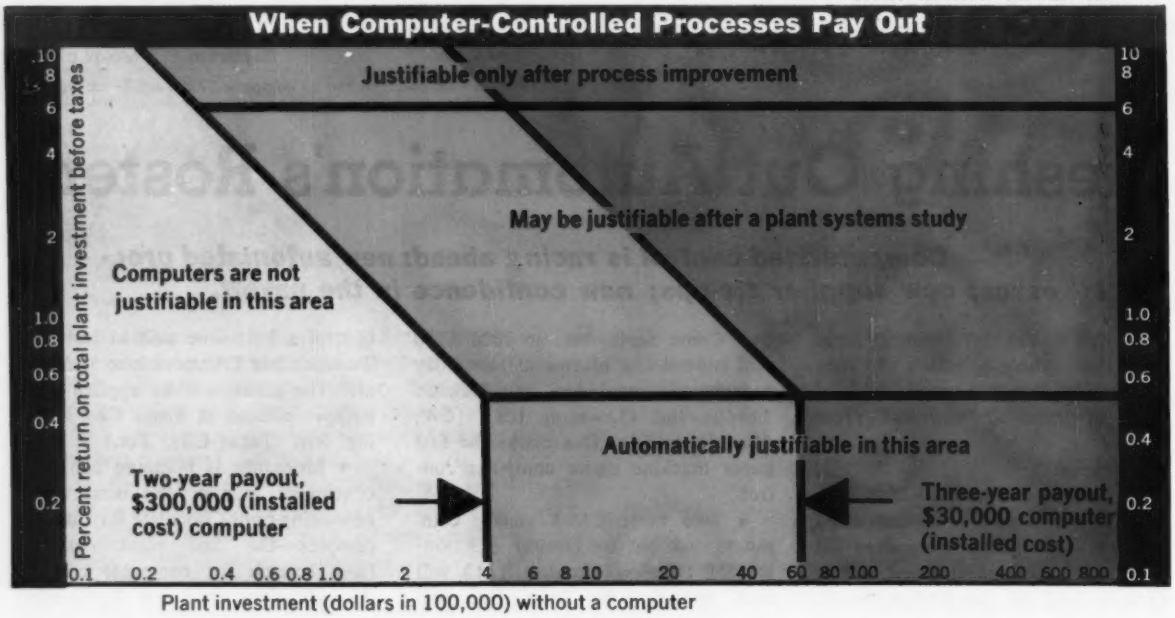
Analog Trend: The Dresser Electronics installations are two cases in a growing flow of new analog computer applications. Analog computer sales to all industries totalled only $500,000 in '58; they were $1.5 million in '60 and the '65 figure is pegged at a whopping $10 million. Digital computer sales for process control will hit $6 million this year. Electronic Associates (Long Branch, N.J) and Beckman Instruments (Fullerton, Calif.) lead in chemical process plant installations.

The overriding factor favoring analog computers (in number of units sold) is price. Most are tagged at $10-30,000 (*CW, Oct. 22, '60, p. 34*). Digitals sell in the $100,000 range.

Whether or Not: Deciding which kind of computer to choose, however, takes a back seat to the problem of whether to computer-control a process at all.

The graph (*below*) provides a quick means of evaluating the desirability

Source: Monsanto Chemical Co.



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Dr. T. Keith Glennan tells why he feels the best location in the nation is better than ever

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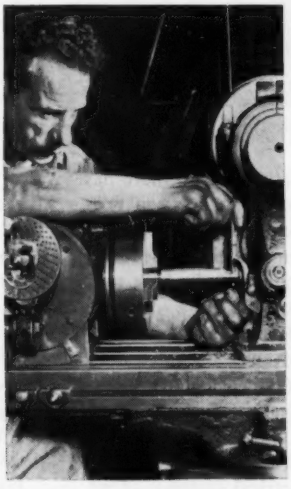

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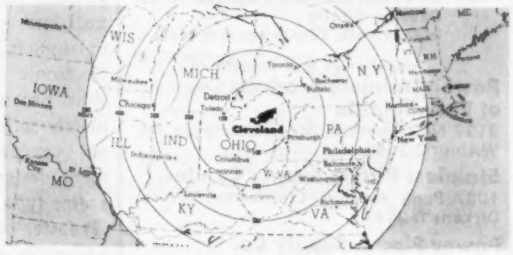

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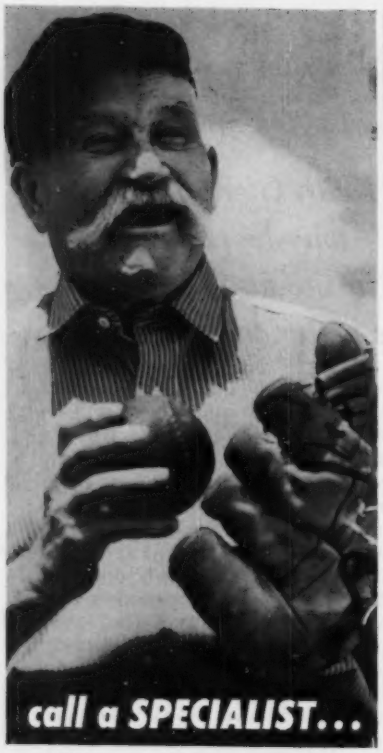

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of computer control. The zone above 6% return on investment calls for process improvements. If a plant systems study indicates a 6% return or better after computer installation, the chances are that the plant was not originally designed for optimum operation. Instead of crediting the high return to the computer, a portion of it should be deducted for gains that could result from improvements in the process itself.

The graph also shows that ease of justifying a computer varies: (1) inversely with the cost of the computer; (2) directly with the cost of the plant (this is one reason why oil firms are so interested in computer control—refineries are usually much larger than chemical plants); (3) inversely with the age of the plant (a new plant is likely to have extensive instrumentation, while an old plant requires investment in control equipment).

The graph, however, depicts the general case. Computer justification requires a separate study for each plant. Steady improvement in computer hardware and instrumentation has not been paralleled by growing support by management for the systems approach—keystone of sound computer justification. A big step in this direction, however, is Monsanto's Chocolate Bayou complex, designed from the beginning to operate under computer control.

Logical Unions: The two intercompany agreements (TRW Computers-Swartwout; Allis-Chalmers-IBM-Consolidated Systems) are logical marriages. Customers stand to gain from integrated selling and engineering efforts.

In instrumentation *per se*, there has been a long-term battle between proponents of pneumatic and electronic instruments. Even though an electronic triumph is foreseen in the long run, electronic instruments are making slow progress. Reasons: (1) a completely satisfactory electric valve does not yet exist; (2) electronic instrument designers have failed to standardize type and magnitude of signals; (3) faster control responses—the main advantage of electrical systems—were not capitalized upon in early design efforts.

However, because of new solid-state components, electronic control equipment offers marked maintenance benefits, and seems to be gaining.

Match in the Making: Thus far an analog computer manufacturer has not teamed up with a digital computer maker. Firms in each area have come up with hybrid systems—attempts to incorporate the benefits of both kinds of computers in one. But they have not yet joined to cover the whole field of computer process control. One reason: the products have such different applications; if an analog computer can be compared to one particular tool or operator, the digital is analogous to an assembly line or an executive committee.

Push Is On: Computer manufacturers have a tremendous investment in the process control business, and are being pressed hard by competition.

Computer process control is still in its infancy. (Only one of the installations listed on p. 59 is two years old.) But it's growing fast, challenging profit-conscious CPI firms to make the most of their unfolding opportunities.

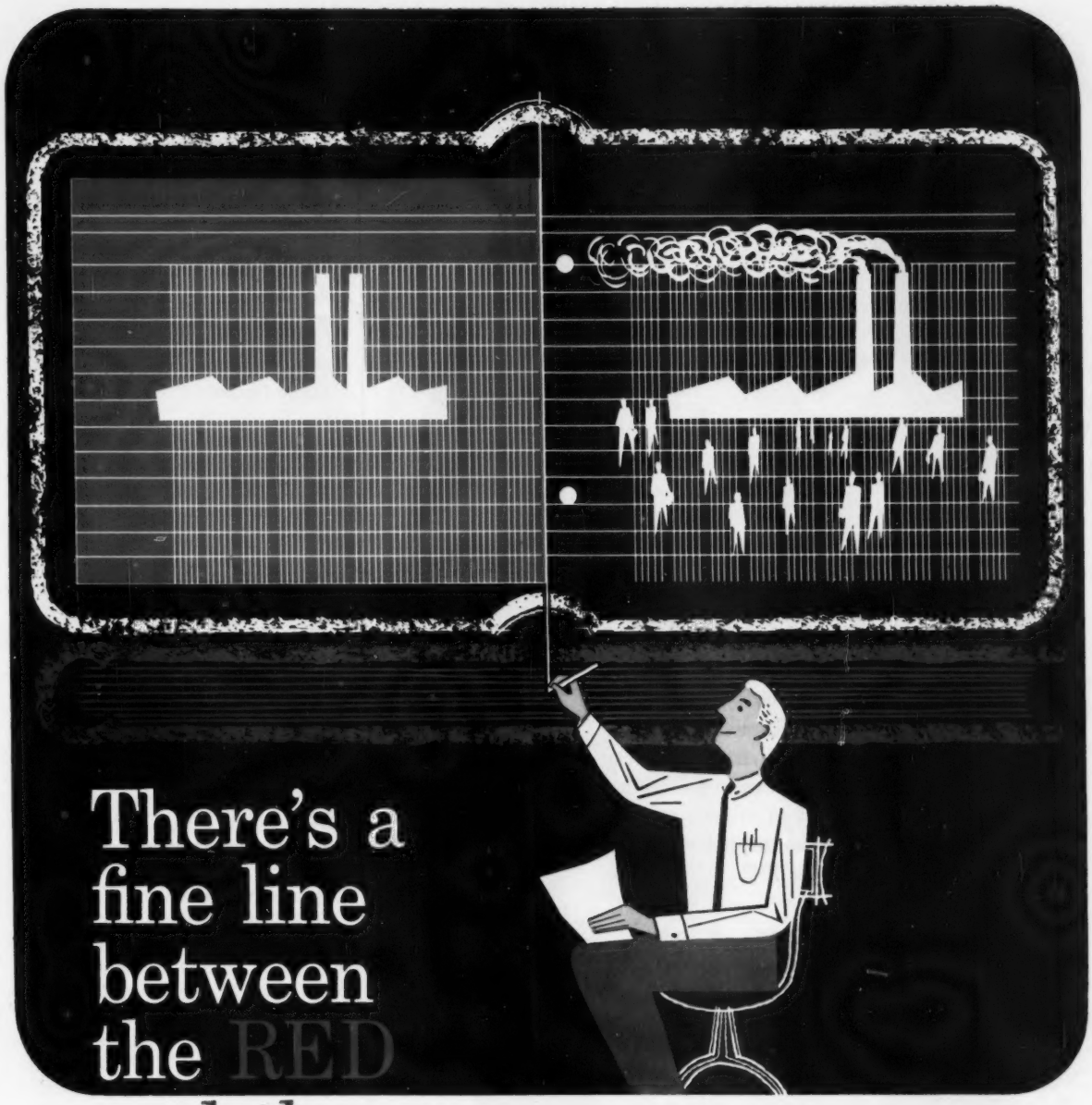
New Sulfur Feeder

A recently developed natural gas field near Bremen, West Germany, will be the site of the first Fluor solvent-process gas-treating unit outside the U.S.

The first U.S. plant was recently brought onstream at Terrell, Tex., by El Paso Natural Gas Co. This unit cleans natural gas containing about 53% carbon dioxide and no hydrogen sulfide. The German unit, which will treat gas containing up to 15% hydrogen sulfide as well as 20% carbon dioxide, will feed a Claus-type sulfur plant. Significance: it suggests that the process may prove economical for a broader range of uses than carbon dioxide removal alone.

Special Solvents: Key to the process is a solvent tailor-made for the type of acid gas (carbon dioxide or hydrogen sulfide) removed. Solvents include propylene carbonate, glycerol triacetate, butoxy diethylene glycol acetate, and methoxy triethylene glycol acetate. They are chosen with three primary properties in mind:

(1) They work by means of physical rather than "chemical absorption." Chemical absorbents are ruled out because they generally require high heat consumption for regeneration, boost investment costs for heat-exchange equipment and also raise operating



There's a fine line between the RED and the BLACK

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costs through steam consumption.

(2) They must have a high absorption capacity. Conventional nonchemical solvents are usually limited by the percent of acid gases absorbed, require high solvent circulation rates, thus increasing costs.

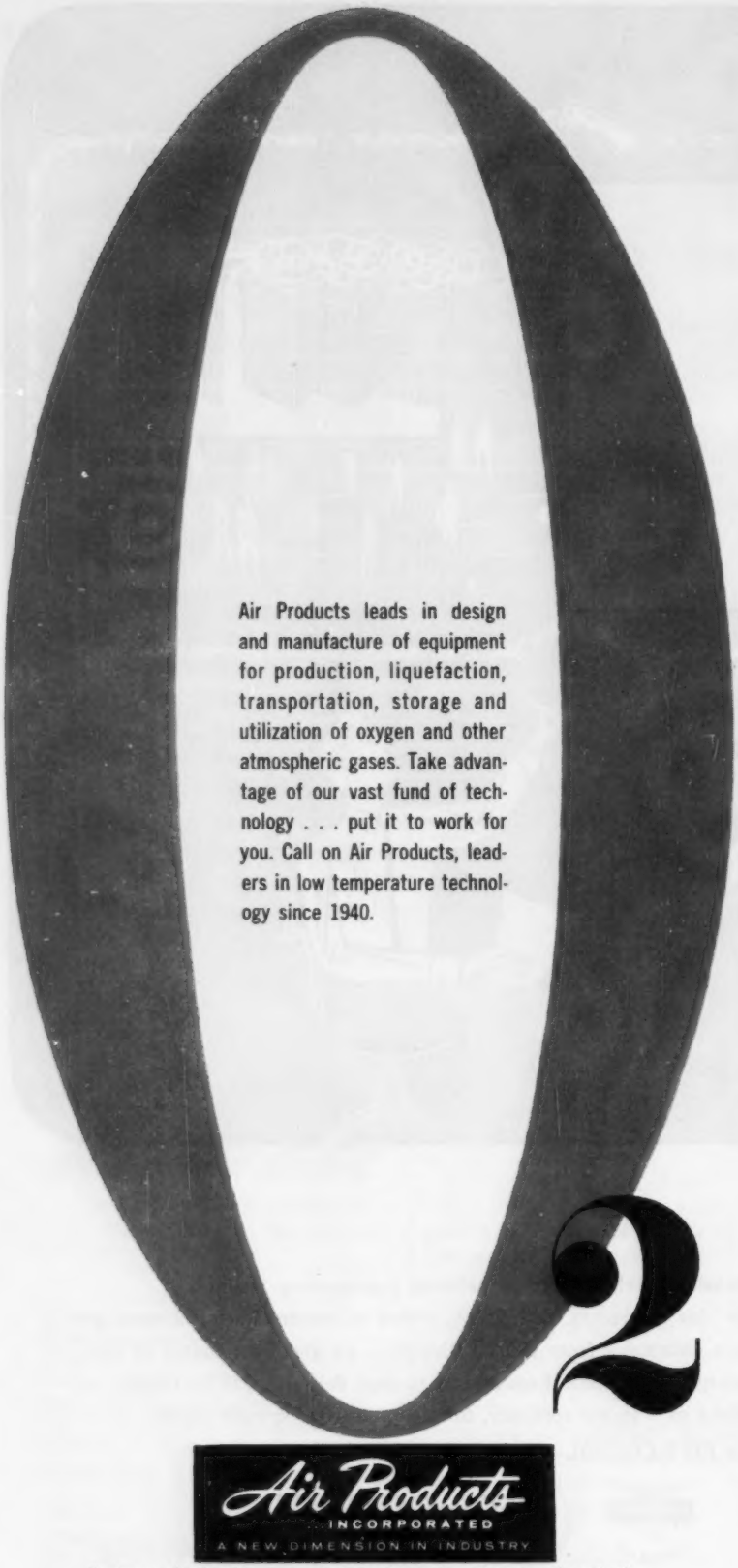
(3) They have a favorable selectivity. Although some solvents can physically absorb large amounts of acid gases, they take up equivalent amounts of hydrocarbons, leading to increased costs for fractionation.

Facile Flashoff: This latter property, favorable selectivity, is the one which dictates the economic limits of the Fluor system. The process operates in three steps: (1) raw gas is passed through an absorber, which returns treated gas as top product; (2) saturated solvent leaving the bottom of the absorber passes to an intermediate flash drum, where light hydrocarbons are flashed off and returned as recycle to the raw gas absorber; (3) semi-stripped solvent leaving the bottom of the intermediate flash drum passes to a low-pressure flash tank, where the acid gases are flashed off. Heaviest hydrocarbons recycled from the second (intermediate flash) step are usually close to ethane. Thus, "wet" gas, or gas with high percentages of components heavier than propane are likely to show uneconomical losses.

Guesstimations: Fluor says that the German plant, with built in "flexibility" (overcapacity), will cost $2 million to treat 28 million cu.ft./day of raw gas. Allowing $1 million for the sulfur unit brings investments for the treating unit down to $1 million, about 3.6¢/daily cu.ft. Fluor previously reported that its process can handle gas containing 53% carbon dioxide with no hydrogen sulfide for an investment of about 2.2¢/daily cu.ft.

This report also predicted total manufacturing costs of about 2¢/-1,000 cu.ft. of raw gas* (distinct from daily cu.ft. costs) with investment accounting for about half of this. Since the Fluor process does not need heat to flash off the absorbed gases, operating costs should not change radically from one plant to another. And a plant handling hydrogen sulfide might be prorated on the basis of investment. Such proration gives about 2.6¢/1,000 cu.ft. for treating raw gas with 15% hydrogen sulfide and 20% carbon dioxide.

* *Chemical Engineering*, May 30, '60, pp. 46-48.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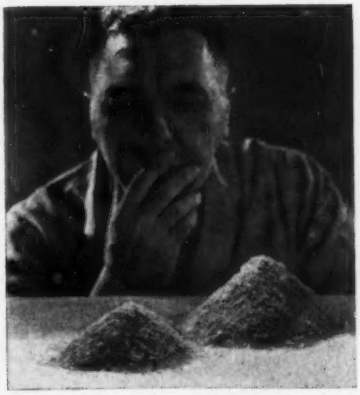

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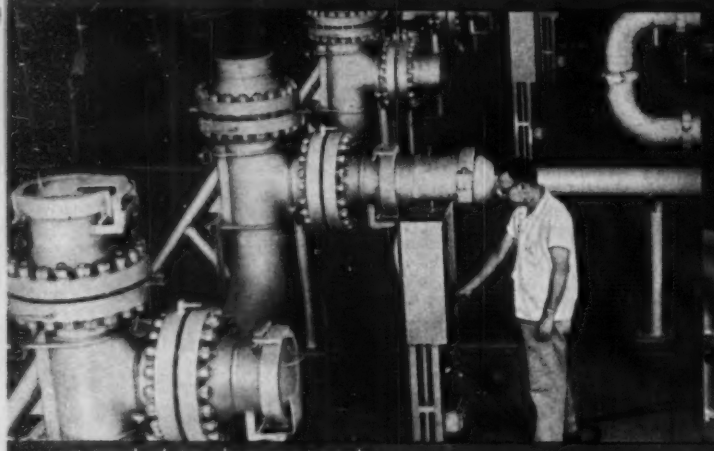

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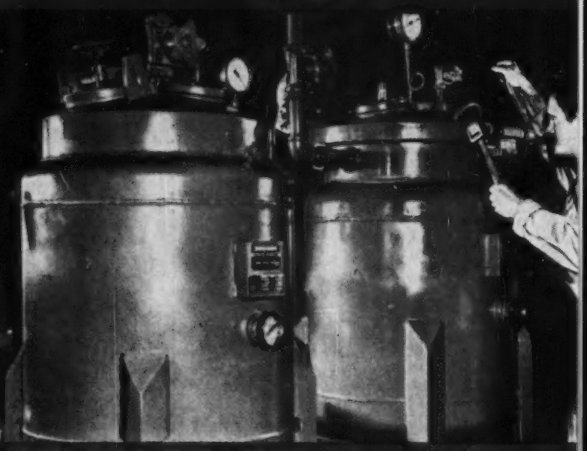

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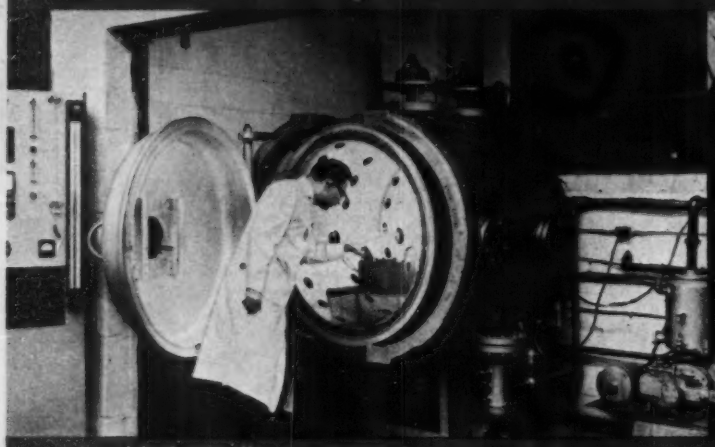

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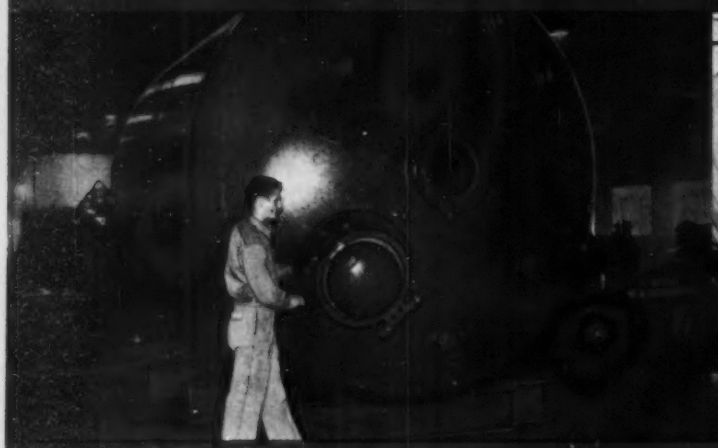
and recovery terminals . . .



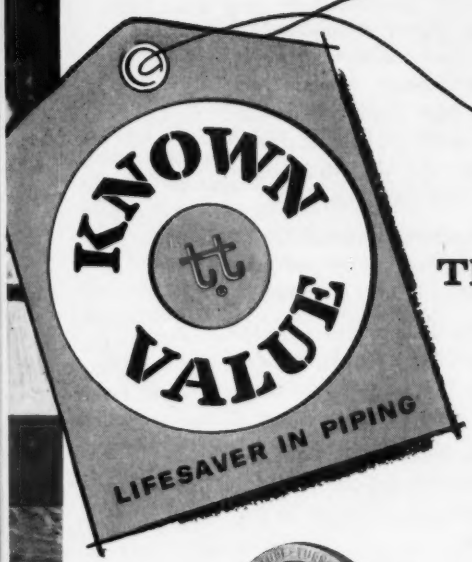
on synthetic rubber
manufacturer's blowdown tanks . . .

on paint manufacturer's
vacuum reactor vessels

TUBE-TURN Hinged Closures are stocked by and sold exclusively through Authorized Distributors.

Closures pay their way

all the way!



They save in system design
in easier installation
in faster, safer operation

If your operations require quick or frequent access to pipe ends, tank or vessel openings, TUBE-TURN Hinged Closures provide a swift, safe and economical solution. So simple to operate, one man can open and close even the largest TUBE-TURN Hinged Closure in a matter of minutes. No hammering, no tugging, no wrestling with massive caps or flanges. Just loosen the yoke bolts, swing back the head, and the opening is fully exposed and accessible.

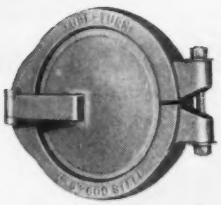
The exclusive *self-locking* tapered yoke, head, and hub design of TUBE-TURN Hinged Closures assure positive and uniform sealing while the self-bleeding safety feature of double bolt closures forewarns the operator should he try to open the closure under pressure.

TUBE-TURN Hinged Closures cut your installation costs too. Completely factory assembled, no time or effort is wasted on job-site fabrication. Only one circumferential weld is needed to join the closure to the pipe end or vessel opening.

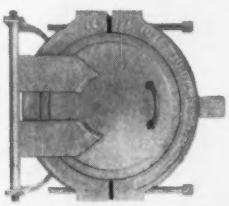
TUBE-TURN Hinged Closures are regularly furnished in forged carbon steel. However, they are also available in other metals and alloys and may be glass lined or stainless clad. They also may be furnished to meet design requirements of ASME.

For the practical, dependable, safe solution to your closure problems, specify TUBE-TURN Hinged Closures. Look for the famous "tt" trademark when you buy. It's your guarantee of quality . . . the mark of *known value*. Write for Bulletin TT1034- E143. TUBE TURNS, Louisville 1, Kentucky.

"TUBE-TURN" and "tt" Reg. U. S. Pat. Off.



SINGLE BOLT TYPE
with Removable or Swing Bolt
in sizes 2" thru 8" for ASA 150-lb,
300-lb or 600-lb Service



DOUBLE BOLT TYPE
with Double-Ended Bolts
in sizes 8" thru 42" for ASA 150-lb,
300-lb or 600-lb Service

VERTICAL TYPE
with Attached Wrenches
and Counterbalanced Head
in sizes 8" thru 42" for
ASA 150-lb Service

TUBE TURNS

Division of CHEMETRON *Corporation*

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Our experienced technical service department will gladly consult with you on new product planning. We invite your interest in our products and service.

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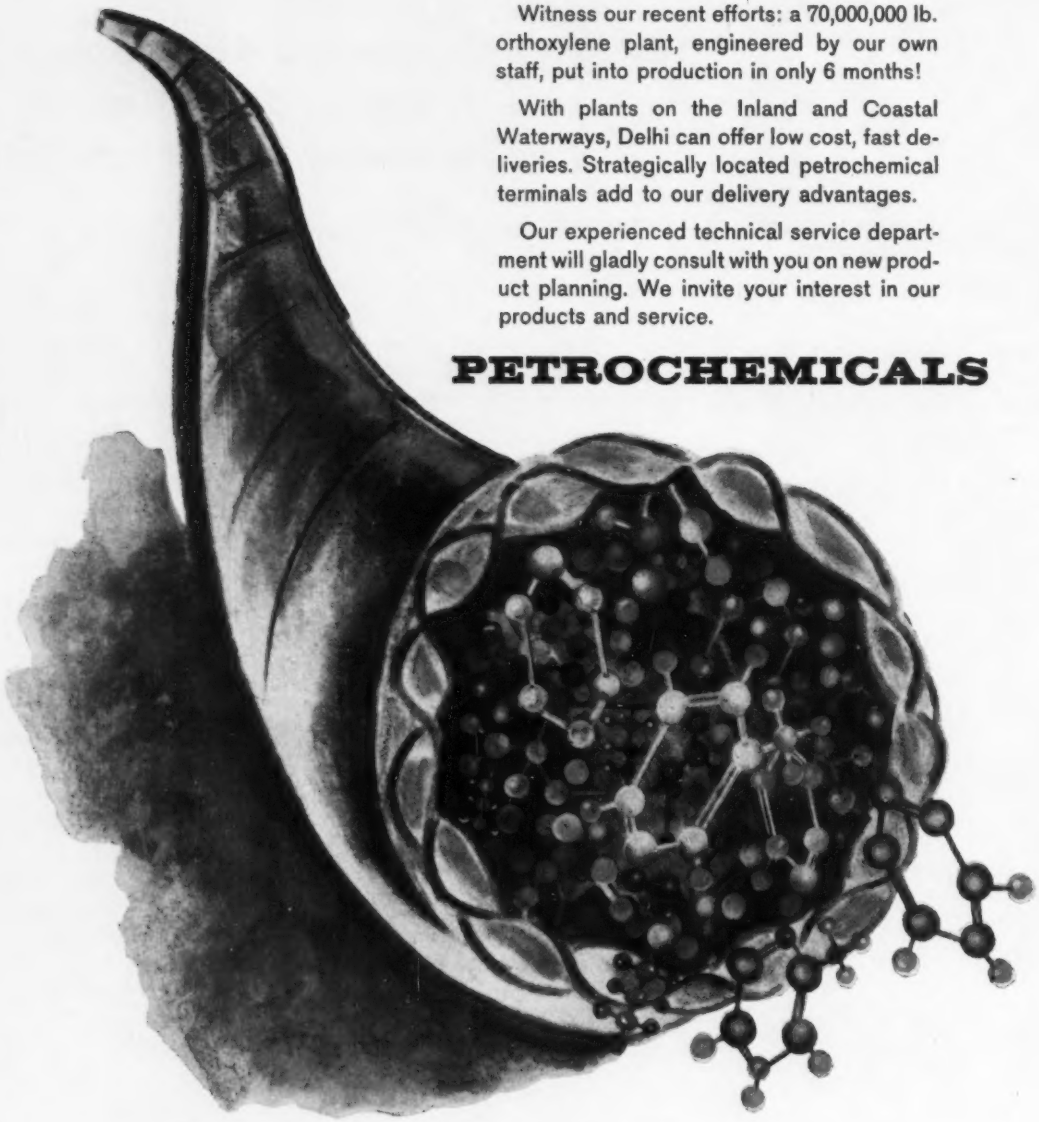

CHEMICAL DIVISION

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Specialties Makers Shrug Off the Recession

Aerosols get top billing in the latest CSMA surveys: output climbed 17% in '60 to record 670 million units.

As though it had read its press notices, Chicago last week provided a wind-buffeted setting for the 47th midyear meeting of the Chemical Specialties Manufacturers Assn. But there was balm for the 1,000 wind-burned convention goers—pleasing news of the specialties industry's 1960 performance, as tabulated from production surveys by CSMA.

Aerosols turned in an especially good record in '60. Production of nonfood aerosols rose to an all-time high of 670 million units, a gain of 17% over the previous record of 575 million in '59. This sharp rise was particularly impressive in light of slack activity in other businesses.

Hair sprays and dressings, with production of 116.9 million units, continued as the top item in the field and showed a healthy increase over '59. Other products that registered gains were waxes and polishes, up more than 35%, and paints and coatings, which climbed 25%, to 68 million units.

Shaving creams, which account for about 10% of all aerosols sold, did about the same business unitwise, but there was a substantial gain in the number of larger units (16 oz.) sold. Output climbed from 306,000 in '59 to 2.5 million in '60. Total shaving lather units turned out was 68.2 million.

Cologne and perfume produced went up 15% in '60 with most of the increase involving smaller-size packages. However, aerosol dental creams showed a marked decline—to 2.8 million units from the previous year's 11.2 million.

Two newcomers to aerosol packaging last year did particularly well. Aerosol starch output totaled 25 million units, while 14 million auto deicers were turned out.

Canadian aerosol production (nonfood) was estimated to have been about 25 million units in '60, compared with 20 million in '59.

The CSMA considered the inclusion of food aerosols in its survey but decided results would be too revealing of individual company sales. However, to give some idea of the present market for pressurized packaged foods, it questioned container makers, and found that 60 million cans were sold in '60 for these products.

CSMA this year again queried can makers concerning the number of aerosol containers turned out in '60, asked valve manufacturers for their totals too. The figures reported—620 million containers and 788.2 million valves—indicate close agreement with the survey's over-all figures on aerosols produced.

Antifreeze Static: The antifreeze market last year remained about the same as in '59. U.S. motorists consumed about 121 million gal. of antifreeze.

Ethylene glycol antifreeze accounted for 110.4 million gal. (90% of the total), while 10.5 million gal. of methanol-type products were marketed. In '59, the figures were 108 million and 12.1 million, respectively.

Use of the gallon-size units continued to climb—2.5 million more than in '59. Bulk shipment of ethylene glycol antifreeze amounted to about 33 million gal., 30% of the total.

Sales to auto makers dropped a bit. Some 5.9 million gal. were sold to the auto industry, compared with 7.3 million gal. the previous year.

Cool to Cooling Systems: Automobile cooling system chemicals experienced a dip in '60. About 32 million consumer packages of these chemicals were produced in the U.S., compared with 33.5 million in '59.

Production of cooling system cleaners was up about 0.5 million units—from 5.4 million in '59 to 5.9 million in '60. Cooling system sealers went the other way. Production dropped from 16.9 million units to 14.4 million.

'61 Looks Promising: Most segments of the specialties industry expect to chalk up another good record this year. The aerosol business, for one, is counting on climbing to another all-time production high. The next CSMA meeting is Dec. 4-6 at the Roosevelt Hotel in New York City.

How Three Key Specialties Fared in '60

	1959	1960
Aerosols	(million units)	
Hair sprays	79.7	116.9
Coatings	52.6	68.2
Room Deodorants	59.7	81.8
Space Insecticides	38.8	52.1
Colognes and perfumes	34.0	42
Glass Cleaners	18.5	19.7
Shoe and leather dressings	13.7	17.4
Antifreeze	(million gallons)	
Ethylene glycol	108	110.4
Methanol	12.1	10.5
Cooling System Chemicals	(million packages)	
Cleaners	5.4	5.9
Sealers	16.9	14.4

DuBois Aims High

This week DuBois Chemicals, Inc. (Cincinnati), is readying four new products for launching into the $250-million/year industrial and institutional detergents market. The new entries —part of DuBois' general expansion program—shape up as the company's bid for a bigger stake in the industrial cleaning field.

• The restaurant and institutional food trade will get its first look at Mir-a-kol, a liquid detergent for machine dishwashing, at the National Restaurant Show in Chicago this week. The product is packaged in a special container with a dispenser. It's a result of DuBois' emphasis on liquids as the biggest area for growth in detergents.

• June 15 is the target date for introduction of Du Pan, a new pot and pan washing compound for manual cleaning of utensils in restaurants and institutions. Du Pan, said to be nonirritating, contains surfactants with high emulsifying capacity and suspends food particles as pans are washed.

• Also in June, DuBois will offer two floor products. In step with the growing trend toward consumers' use of acrylics, the firm will market Prestige, an acrylic floor wax for institutions, offices and other commercial buildings. DuBois says the wax will not mar from heel scuffs, and is slip resistant, durable and easily maintained. Other claims: it has high gloss and low friction.

As a companion item, the company will sell a heavy-duty wax stripper and floor cleaner called Wagway. This low foamer is said to have rapid penetration, high soil retention and is more easily rinsed.

Record Sales: DuBois chalked up its 27th straight year of record sales in the fiscal year ended in February. Sales rose 6.5%, from $25.3 million in fiscal '60 to $26.9 million in fiscal '61.

President Louis Lerner *(picture)* forecasts a further "substantial" increase in the current year, expects new products to contribute to this growth. Lerner declines to make specific sales projections, but some Wall Street investment houses recently projected the firm's sales to $55 million in the next three to five years.

During the past year, DuBois has been one of the most active firms in the industrial detergents field in expansion and acquisition.

In April '60 it merged with Hall-Scott, Inc., a West Coast producer of marine engines. Operations of Hall-Scott have since been discontinued and its assets sold. Other acquisitions are expected.

Internal expansion is continuing at a fast clip. Last year a Canadian subsidiary was formed and construction begun on a new plant near Toronto. It will be completed this summer. Plants in Cincinnati and Dallas and in New Jersey are currently being expanded, and the company is now planning to enlarge its Los Angeles facilities.

DuBois' Lerner banks on new products to further his growth plan.

Also last year DuBois became a publicly owned company with stock traded on the New York Stock Exchange.

New Projects: Although roughly one-third of its sales volume comes from dishwashing compounds, the company is now working on a number of diverse projects. A new area DuBois expects to enter is electrolytic cleaning in the metal plating industry. It is also working on equipment-cleaning techniques in the petroleum industry; central lubricating systems for bottling plants; and in-place sanitizing operations for pasteurizing and brewing lines.

Other projects for the immediate future include peelable floors for Atomic Energy Commission installations and some new floor sealers. Clearly, DuBois is banking on new products to play an increasingly important role in its growth.

Purex Purchases

Purex Corp. Ltd. (South Gate, Calif.) last week completed purchase of the T. F. Washburn Co. (Chicago). The 75-year old Washburn Co. manufactures and sells paint vehicles, varnishes and protective coatings, polymers, resins, dryers, and a complete line of private-label floor finishing materials for the sanitary supply industry.

The West Coast soaper will operate Washburn as a wholly owned subsidiary. The consolidation was achieved through an exchange of stock.

Among the pioneering products developed by Washburn have been thixotropic paint vehicles; concentrated polymer floor polishes, which can be shipped as 40% solids; and anti-slip wax using Du Pont's Ludox. Washburn's '60 sales: $3.4 million.

PRODUCTS

Vinyl Coating: The U.S. Stoneware Co. (Akron 9, O.) is selling a new protective coating-Tygon AV Series —for use with airless spray equipment. The coatings can be applied over any standard Tygon primer, and the firm says, almost any required thickness can be put on in one coat without sag.

•

Yellow Pigment: Ansbacher-Siegle Corp. (92 Chestnut Ave., Staten Island, N.Y.) says its nonresinated Benzidine Yellow Pigment combines strength with low oil absorption. Rangoon Yellow Toner 73 T 51 enables the ink manufacturer to obtain improved formulations, according to the company.

•

Synthetic Latex: Goodyear Chemical Co. (Akron, O.) has developed a new synthetic latex, called Pliolite Resin Latex 481-X, for controlling corrosion and rust on automobile bodies.

•

Wax Remover: Chemical Corp. of America (Tallahassee, Fla.) is marketing a floor wax remover called Waxfree. It is designed for removal of all types of floor waxes, is poured on floors without mixing and softens old wax in a few minutes. The product is packaged in a plastic bottle.

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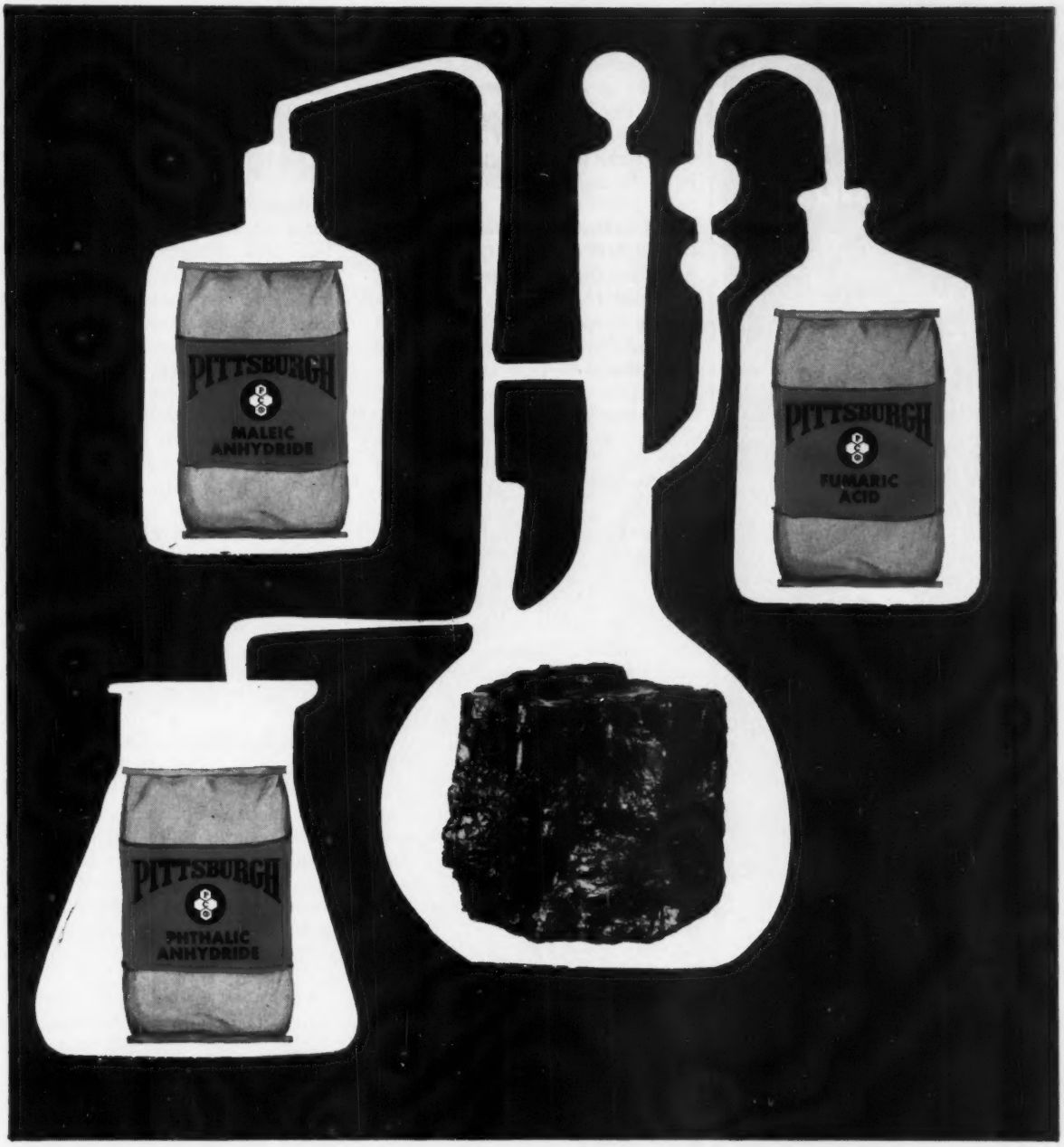
Fuel-Resistant Adhesive: Schwartz Chemical Co., Inc. (50-01 Second St., Long Island City, N.Y.), is market-



Pittsburgh Chemical is now Basic in "all three"!

With the completion of its new, integrated maleic anhydride plant, Pittsburgh Chemical is now basic in three important intermediates. Now, more than ever before, you can depend on Pittsburgh for uniform, high purity phthalic, fumaric and maleic delivered to meet your toughest production needs. Make Pittsburgh Chemical your "one-stop" source for these dibasic acids and you'll simplify your paper work, and—by ordering mixed carload lots—you'll realize significant cost savings and maintain tighter inventory control. Pittsburgh Chemical specializes in service to resin makers. Call today and let us demonstrate how we can help *you*.

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INDUSTRIAL CHEMICALS DIVISION

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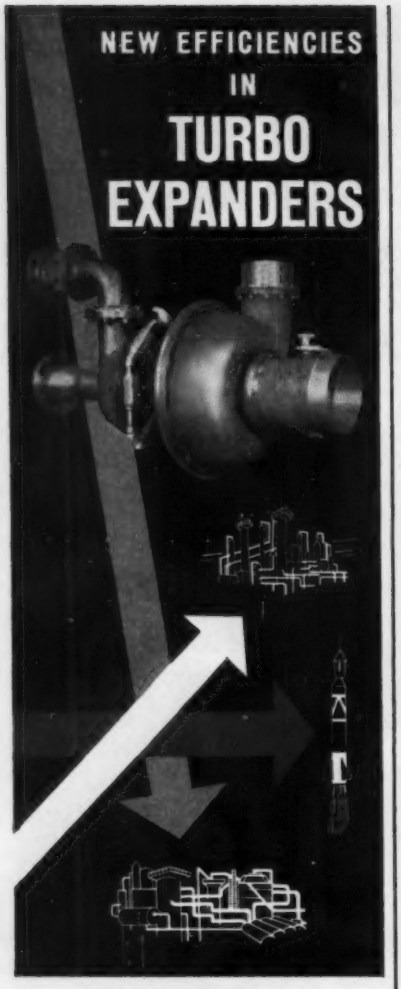

For Gas Liquefaction

Compact turbo-expanders by STRATOS have brought a new level of efficiency in turbo machinery for the chemical and petro-chemical industries. For many new Hydrogen, LOX and ammonia plants, Stratos equipment is specified.

Why STRATOS' units? They're compact and efficient and have demonstrated that they can be kept on stream continuously for over a year on end. Complete thermo-aerodynamic studies made for each application permit efficiencies as high as 86%. Behind each design is 20 years service-proven engineering experience in high speed, maximum performance turbo-machinery—turbo-expanders for cooling gases down to almost absolute zero, for temperature reduction in continuous flow chemical processes, for power recovery from gas streams, and for use in mobile electrical power plants operating with nuclear fuel.

For detailed information or technical literature, write—

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ing an adhesive formulated especially to resist jet and conventional aircraft fuels. Rez-N-Glue 249 is an oil-resistant synthetic rubber base of medium syrup viscosity. It is available in 1-, 5-, and 54-gal. containers.

•

Nonflammable Solvent Coating: Columbia Technical Corp. (24-30 Brooklyn - Queens Expressway West, Woodside 77, N.Y.) has developed a coating claimed to be the first solvent type that's nonflammable and in liquid form. HumiSeal Type 1B20 is a single-component, air-drying, solderable, acrylic-base coating. It is designed to eliminate shipping and storage problems now facing users of these types of coatings.

•

Glass Controller: The LoBo Chemical Products Co. (214 Northfield Rd., Bedford, O.) is offering Ure-Phlat, a glass controller for polyurethane varnishes. It is a stable, free-flowing paste, gives a rubbed effect when added to clear varnish. The product is said to retain the water- and mar-resistance qualities of polyurethane varnishes.

•

Teflon Tester: Chemplast, Inc. (3 Central Ave., East Newark, N.J.), producer of Chemfluor Teflon products, is offering free test kits to show porosity in improperly molded Teflon sheet. The kit contains a supply of penetrant and solvent, applicator and instructions.

•

New Emulsion: Shawinigan Resins Corp. (Springfield, Mass.) is offering a vinyl copolymer emulsion, Resin D-845, which is said to have an unusually high degree of inherent tack and adhesion. Suggested uses: in adhesives formulations, particularly pressure-sensitive and contact adhesives.

•

Animal Bedding: The C. P. Hall Co. (5245 West 73rd St., Chicago) has a new material for animal bedding called Stop O. It neutralizes odors and inhibits growth of bacteria. Hall suggests the product for laboratories, veterinary clinics, pharmaceutical houses, and kennels.

•

Flame-Retardant Epoxy: Union Carbide Plastics Co. (New York) has made available a flame-retardant epoxy resin (chemically the diglycidyl ether of tetrachlorobisphenol A) for hot-melt castings and dry lay-up laminating systems. Combined with aromatic amine or anhydride hardeners, Bakelite ERL-0625 forms cured systems with properties similar to those of conventional resins.

•

Water-Soluble Oil Paint: Consolidated Chemical & Paint Mfg. Co., Inc. (456 Driggs Ave., Brooklyn, N.Y.), is one of the first companies to offer a water-soluble linseed oil-base housepaint. The coating, called Pronto, is for exterior use on home or industrial buildings. One coat covers most wood, metal and masonry materials, including chalky outdoor surfaces. It is available in 1- and 5-gal. cans at $7.95/gal., and also in quarts in white only.

•

Germicidal Detergent: Armour & Co. (Chicago) is selling a liquid detergent called Armosol that kills bacteria, cleans and deodorizes in one operation. It is aimed at hospitals and institutions, may be used with ordinary cleaning utensils. It is available in 5- and 55-gal. drums.

•

Cleaning Trio: Lewis Research Laboratories, Inc. (202 South Dean St., Englewood, N.J.), is marketing three new consumer products: Stain-Aid, which removes coffee and tea stains from melamine dinnerware and stains from coffee makers; Drain-Aid, for clogged drains; and Septi-Kleen, for drains, septic tanks, cesspools and pipelines.

•

Vinyl Finish: Metal & Thermit Corp. (New York) has developed a multicolor, spray-on vinyl finish for consumer, architectural and industrial products. The finishes are available in unlimited color and with controllable texture and can be applied to phosphated steel or aluminum by conventional or electrostatic spray techniques.

•

Particle Testers: Magnaflux Corp. (7300 West Lawrence Ave., Chicago) has developed a new family of materials for the wet method of visible and fluorescent magnetic particle testing. The eight concentrates are in powder form and are said to be easy to mix, handle, and store. The materials simplify preparation of the test bath because they can be added directly to the oil. A uniform suspension is obtained almost immediately.

READY

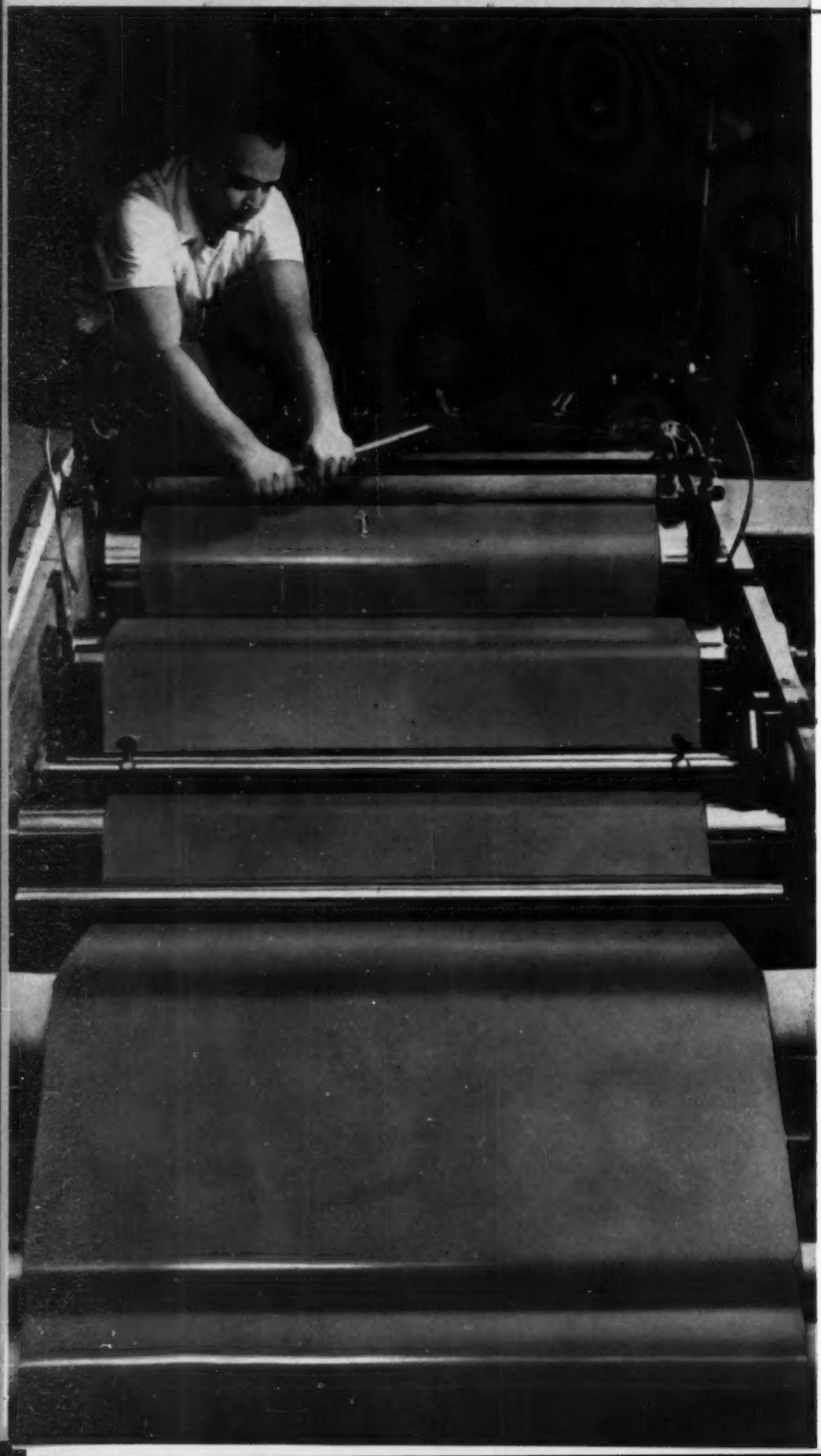
...to help you plan new products
...to help you improve existing products
...to help you cut manufacturing costs

Since February, 1961, Tenite Polypropylene has been in commercial production at Eastman's new plant in Longview, Texas. This is the newest member of the Eastman family of thermoplastics, all bearing the trade name "Tenite."

In Tenite Polypropylene, industry has a versatile new plastic that will replace conventional materials in many traditional applications . . . a plastic that will improve the performance of hundreds of existing products . . . a plastic that could markedly reduce material, fabricating and assembly costs.

And it's a material that's now available in carload quantities.

Tenite Polypropylene offers a broad range of useful properties



High Strength – Tenite Polypropylene has good tensile and impact strength, plus rigidity and surface hardness.

Light Weight – Tenite Polypropylene is the lightest of all solid plastics. This plastic produces more molded or extruded product per pound than most other plastics.

Heat Resistance – The high melting point of Tenite Polypropylene permits objects made from this plastic to be sterilized without suffering distortion. This feature makes it well-suited for hospital and laboratory ware.

Chemical Resistance – Tenite Polypropylene resists the attack of acids and alkalies and a broad range of other chemicals.

Fatigue Resistance – Because it can take innumerable flexings, Tenite Polypropylene can be designed as one-piece moldings with integral hinges.

Resistance to Moisture Vapor Transmission – Tenite Polypropylene is an effective barrier to moisture vapor transmission. In film for packaging, this feature is a vital factor in prolonging the freshness of many foods.

Red polypropylene sheet rolls off an extruding machine in Eastman's plastics development laboratory. For two full years before launching polypropylene production on a full-scale commercial basis, Eastman engaged in exhaustive research and study of the characteristics and properties of polypropylene, thoroughly pretesting the material in actual molding and extrusion operations and developing a number of formulations for use in plastics fabrication.

Tenite Polypropylene can be used in all these ways

Dielectric Strength – Tenite Polypropylene has excellent dielectric properties and retains these properties even under adverse moisture and temperature conditions.

Abrasion Resistance – Tenite Polypropylene has excellent abrasion resistance. Its surface hardness suggests its use as gears or bearings. Conveniently, it also has a low coefficient of friction.

Resistance to Environmental Stress Cracking – Tenite Polypropylene has excellent resistance to stress cracking. No environment has yet been discovered in which stress cracking of polypropylene occurs.

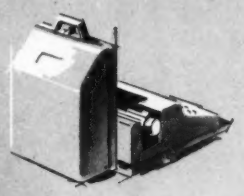
High Gloss – Articles molded of Tenite Polypropylene have a natural lustrous finish, and film extruded of Tenite Polypropylene exhibits a sparkling surface.

Heat Sealability – Tenite Polypropylene is relatively easy to "tack" or "weld." This can be accomplished in many cases with existing equipment.

Printability—With a simple treatment, film of Tenite Polypropylene can be easily printed by conventional methods.

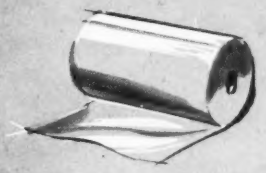
Resistance to Mold and Mildew—Tenite Polypropylene resists the growth of mold or mildew, and is not attacked by insects or marine organisms.

Processability – Tenite Polypropylene has excellent flow properties, permitting good mold-fill in injection molding.



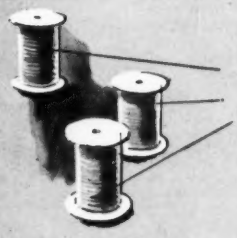
Injection Molding

Tenite Polypropylene can easily be molded into a wide variety of durable low-cost parts with high gloss and surface hardness—for example, appliance housings, automotive accessories, toys and housewares.



Extruded Film and Sheeting

Tenite Polypropylene can be extruded into sparkling clear film and sheeting, with the excellent protective characteristics so important for durable packaging. It can also be extruded in opaque, translucent, or transparent colors.



Monofilament

Tenite Polypropylene can be extruded into monofilament offering high strength, wet or dry, and excellent flexibility at low temperatures. Webbing for outdoor furniture and cordage are among the many possible end uses for this tough material.

Thermoforming

Sheet of Tenite Polypropylene can be used in vacuum forming, pressure forming and skin packaging, with existing equipment.

Wire and Cable Covering

Excellent electrical, thermal, and mechanical characteristics make Tenite Polypropylene desirable for either primary insulation or jacketing. Formulas are available for solid coatings, or for cellular coatings of extra-low dielectric constant.

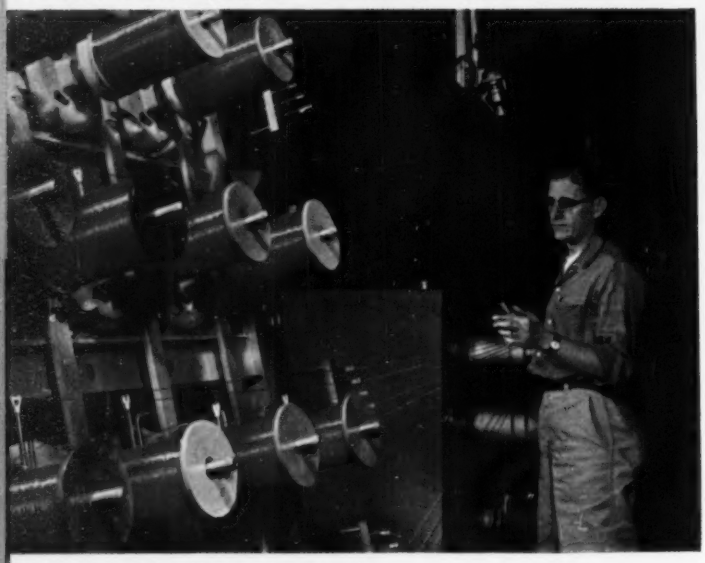
Pipe

Chemical inertness, resistance to stress cracking, and heat resistance make pipe of Tenite Polypropylene a good choice for industrial use.

Blow Molding

Tenite Polypropylene in special formulations can be blow-molded into many articles possessing exceptional wall strength, resilience, and chemical resistance.

Spools of lustrous red polypropylene filament, extruded for testing purposes in Eastman's development laboratories. Eastman's work over many years in producing plastics of almost unlimited colors has been of significant value in developing superior polypropylene formulations for monofilament extrusion.



A special word about this new polypropylene

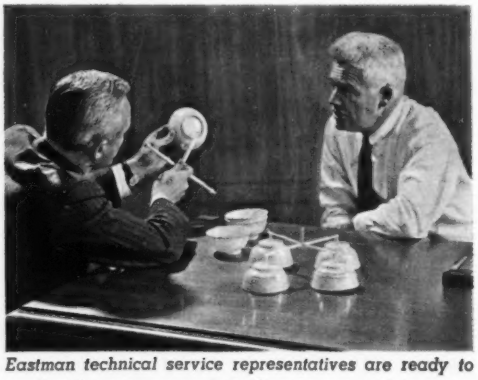
The process for manufacturing Tenite Polypropylene was developed by Eastman scientists, engineers and production staff. This exclusive process yields a polypropylene that is superior in several characteristics to other polypropylenes. We base this statement not only on our own laboratory findings but on the opinions expressed by those users who have had the opportunity to evaluate Tenite Polypropylene from our semicommercial plant during the past year.

Since the first Tenite plastic was produced, in 1932, over 42,000 color effects have been formulated in the Tenite color laboratory. This experience, plus pre-eminence in color photography and textile dye technology, enables Eastman to offer the broadest range of colors available in the entire plastics industry. We believe that Tenite Polypropylene represents an improvement in quality and stability of color in this type of plastic. And Tenite Polypropylene color concentrates now offer molders and extruders a clean, easy way to color polypropylene. Use of these concentrates virtually eliminates color contamination and color uncertainty.

We have given you only the highlights on this promising new plastic. For further information, call a Tenite sales office or send this coupon to EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

This glimpse into the color chip storage room at the Tenite Color Laboratory gives some indication of the variety of colors that has been developed by Eastman since 1932.

Measuring the optical properties of Tenite plastics is but one phase of the diverse and thorough testing done in the Tenite Quality Control Laboratory.



Eastman technical service representatives are ready to work with any customer in finding the most efficient way in which to fabricate products of Tenite Polypropylene.

EASTMAN CHEMICAL PRODUCTS, INC.
subsidiary of Eastman Kodak Company, Kingsport, Tennessee

Please send me more information on Tenite Polypropylene,

for_____
(product or purpose)

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Company_____

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Technology
Newsletter

CHEMICAL WEEK
May 27, 1961

A new method of putting a tungsten coat on complex metal and ceramic shapes has received a boost. Allied Chemical last week revealed it has facilities to produce tungsten hexafluoride on a commercial scale at General Chemical's Baton Rouge Development Laboratory. It had previously supplied the chemical from the same site—but on a small scale.

The new method, which was developed by the National Bureau of Standards and the Bureau of Mines, consists of an *in situ* hydrogen reduction of the hexafluoride to deposit pure tungsten. The object to be coated is placed in a nonporous ceramic cylinder filled with hydrogen, then heated to 900-1200 F. The tungsten hexafluoride and excess of hydrogen are introduced and the tungsten plates out while the fluorine combines with the hydrogen to form hydrogen fluoride.

Coatings can be applied at the rate of 1 mil/minute. Density of the tungsten, says Allied, is better than 99.99% of theoretical, or higher than that produced by other methods, such as powder compacting or flame spraying. Because of tungsten's high-temperature strength, the firm expects the method to find jobs in coating rocket nozzles. And because of the metal's resistance to wear and corrosion, Allied looks for a number of processing applications in tubing and other articles.

•

Stauffer Chemical has licensed National Research Corp. to operate electron-beam melting and casting furnace under its patent. National Research, active in electron-beam technology, has developed a version of the electron-beam furnace that features a double-vacuum system (*CW, March 7. '59, p. 39*).

•

There's a new lineup in hydrodealkylation processes. Esso Research has joined Atlantic Refining and Hydrocarbon Research, which offer for license the HDA process (*CW Technology Newsletter, March 4*). Licensing agreements on the HDA process will now include patent rights, techniques and know-how of all three firms.

Esso will have access to the rights and know-how of the other two firms in its own hydrodealkylation work. Presumably it will bring a strong patent position to the team: HDA is a thermal process, while most of the other hydrodealkylation methods (e.g., Ashland-Universal Oil Products Hydeal) are catalytic. It is believed that others had considered the thermal approach, but shied away because of Esso's patent position.

•

General Aniline is bringing out a new water-soluble copolymer of methyl vinyl ether and maleic anhydride. It's named Gantrez AN resin,

the first of a series of water-soluble polymers and copolymers derived from the firm's high-pressure acetylene chemicals. The new copolymer is a free-flowing white powder, which is also soluble in many organic solvents.

It functions as a thickening agent and protective colloid in aqueous solutions, is compatible with most water-soluble gums, resins and common plasticizers and will not "salt out" in the presence of most inorganic salts. It can be insoluble by cross-linking with polyfunctional compounds. It is available in semicommercial quantities in three viscosities—low, medium and high—and has a developmental price tag of $1.25/lb. in truck and carload lots packaged in drums. GAF foresees applications in adhesives, coatings, textiles, soaps and other chemical process products.

•

A new process for making phthalic acids from xylenes is bidding for use. Catalytic Construction Co. has obtained exclusive licensing rights to a "continuous liquid-phase catalytic oxidation process" developed by Cowles Chemical Co. (Cleveland) with an assist from Catalytic. The process is designed to convert any aylene isomer (ortho, meta or para) into the corresponding phthalic (phthalic anhydride, isophthalic or terephthalic acid). Catalytic says it is in a position to discuss immediate application of the method for production of phthalic anhydride form *o*-xylene.

Amoco is now operating a liquid-phase process for converting an individual xylene into a phthalic (or a mixture of xylenes into a mixture of phthalics), using a catalyst system that employs bromine in the presence of an oxidation catalyst.

Not much is known about the Cowles-Catalytic approach, but Cowles has done work on a two-stage process employing air in the first and nitric acid in the second. Some complex economic variables are involved, but right now there is a feeling in industry that the vapor-phase oxidation is the cheapest route to phthalic anhydride. However, the flexibility offered by a single process to make any of the three might be enough to tilt the balance in some cases.

•

A new water-soluble cutting fluid is being offered by Van Straaten Chemical Co. (Chicago). It's a specially formulated compound called Vantrol 700. Among the claims made for it: it promises to prove suitable in 95% of the operations still requiring straight oils; increases in production and tool life as high as 100% are indicated on the basis of initial tests.

The market for cutting fluids is a big one and a number of firms compete for it vigorously. Of the three types used straight oils account for 60% of it; water-solubles make up 35% of the total; and water-solution fluids the rest (*CW, Oct. 19. '57, p. 92*).

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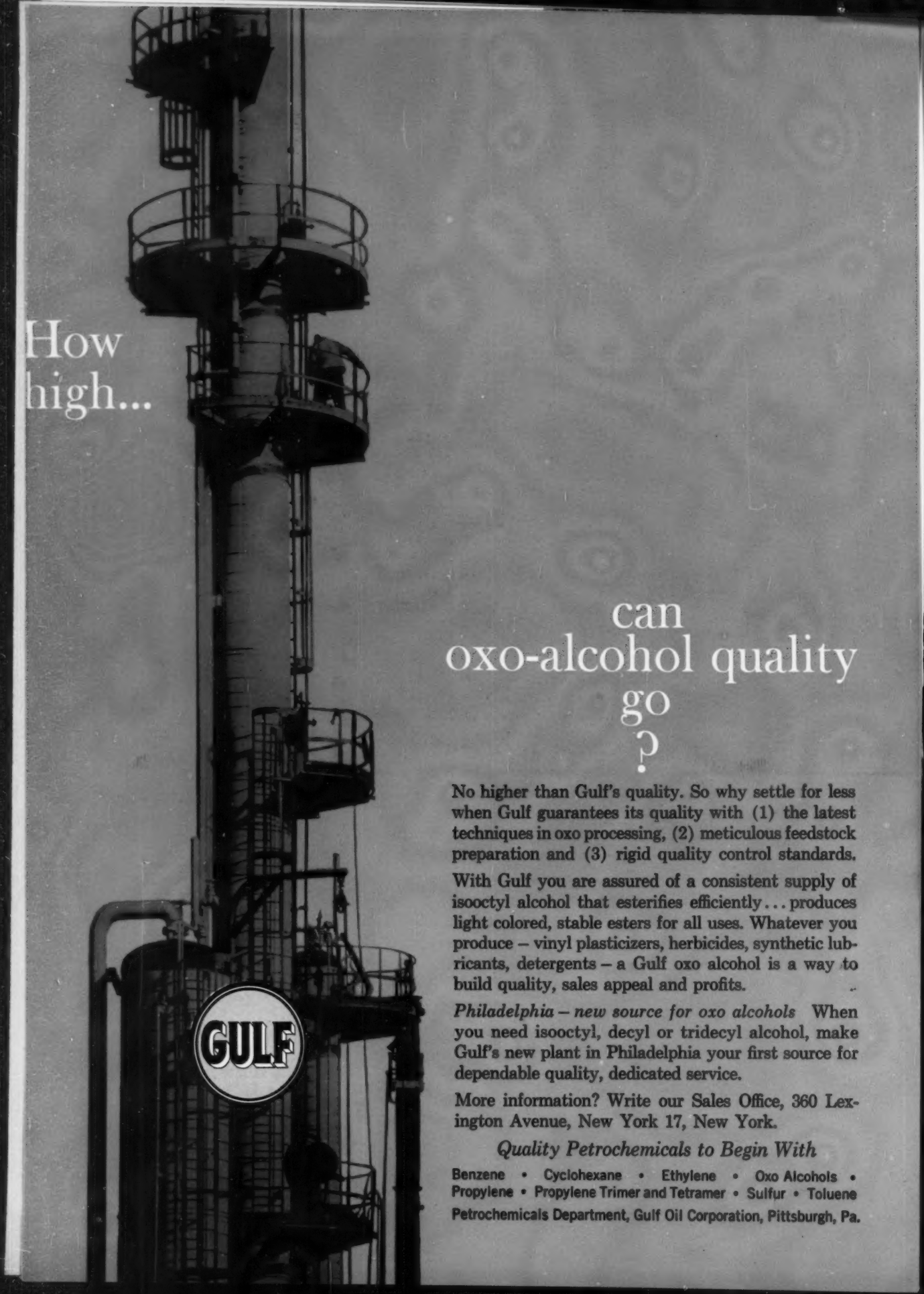

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Petrochemicals Department, Gulf Oil Corporation, Pittsburgh, Pa.

TV camera probes sewers and chemical pipelines, shows leaks and blockages on closed-circuit set in truck.

CW PHOTOS—LARRY STEVENS

Designers O'Toole (left) and Hahnau hold TV camera; pictures of leaks show up on TV screen (right).

They Watch TV for Hidden Pipeline Leaks

The chores of sewer inspectors have been made almost pleasant, thanks to Robert Hahnau and Edwin O'Toole (*picture*). They've developed a television camera that can be run through sewers while the inspector sits in a truck and watches for leaks and blockages on a television screen. And now they're ready to offer the television setup to chemical plants for inspecting the inside of pipeline and other inaccessible equipment.

Hahnau and O'Toole, vice-presidents of Industrial Pipe Repair Corp. (College Park, Md.), spent the last two months demonstrating their equipment in chemical plants in the Houston, Tex., area. With modifications, the basic equipment can be used to view pipe walls, locate cracks and corrosion, and at the same time spot potential leaks.

Inspection costs for complex jobs may be over 50¢/ft. but would probably average considerably less—in the 30-40¢/ft range, according to O'Toole. Cost may well be small, compared with the savings, he adds—e.g., the pinpointing of bad sections in one municipal sewer line reduced costs from several million dollars for replacing the entire line to less than $1 million for replacing only the

Designers assemble miniature camera for inspection trip through 3-in. line.

sections that had been damaged.

How It Works: Hahnau and O'Toole's recently issued U. S. Patent 2,971,259 covers the method and apparatus. For a general inspection, or for locating leaks, a special, small, completely encased TV camera is attached to a drag line that has been floated through the pipe. The line, marked off along its length, has a colored ball attached to it just ahead of the camera. When a leak is sighted (televised), its location is pinpointed —the ball is positioned at the leak and the distance is calculated on the marked-off drag line.

For locating blockages, a rodding machine is used to push the camera through 500-ft. pipe lengths.

Lighting for the camera is provided by spotlights in the head surrounding the camera tube. The camera has a specially designed outer case that is pressurized with air (40 psi.) or inert gas. If the case develops a leak, a pressure switch immediately cuts off all power to the camera, preventing short circuits or explosions from hazardous gas and liquid mixtures that may be in the pipeline.

Most of the work in sewers has been concerned with 6- and 8-in. lines. But Hahnau and O'Toole have developed a camera that will fit into 3-in. lines. A basic problem: getting the camera around 90-degree bends. In a large-diameter pipe, a 3-in. camera would probably pass around most bends; in smaller diameters, the camera might have to be hinged. One solution under consideration: use of a pencil-thin Vidicon tube.

Looking Around: For viewing pipe walls for cracks and corrosion, Hahnau and O'Toole believe they can work out a prism arrangement that would be mounted and rotated in front of the camera. Industrial Television, Inc. (Houston), which has been given a franchise by Industrial Pipe Repair for inspection jobs in the Houston area, is developing an extremely wide-angle (197-degree) lens for doing the job.

Industrial Pipe Repair — affiliated with M. H. Detrick Co., a Chicago manufacturer of high-temperature insulating materials — also has franchised E. T. Haas (Belmont, Calif.) and Axford & Associates, Oakville, Ont., consulting engineering firm.

"We are prepared to do the development work needed to adapt our equipment to fit any application. By having qualified companies in various locations, we can let them do a good deal of development on their own because they are more familiar with the needs of industry in their areas," says Hahnau.

For instance, eight-year-old Industrial Television claims to be the oldest and largest engineering supplier of TV systems to chemical process industries plants. The firm has installed units in kilns, mixers and other inaccessible places.

In addition to licensing service companies to do inspection work for customers, Industrial Pipe Repair licenses companies so they can keep equipment on hand for their own in-plant use. Also, one city is licensed to do its own sewer inspection.

Branching Out: Hahnau sees many potential applications beyond sewer and ordinary chemical pipeline inspection. For example, IPR is working with a steel mill on inspection of furnace stacks. The camera, with auxiliary equipment for cooling, is lowered into the stack without furnace shutdown. In normal practice, the furnace must be shut down and allowed to cool before a man can be lowered inside.

Another potential application is the inspection of deep wells for water and oil and for chemical-waste disposal (*CW, Jan. 7, p. 65*). Depth would be limited to 2,500 ft. unless boosters were added for supplying electricity to the camera.

If Hahnau and O'Toole can capitalize on a number of the potential applications for the camera, they will have come a long way since the sparking of the idea of developing the camera. Three years ago in O'Toole's photography shop in Hollywood, Fla., the city's engineer, while waiting for some photographs to be developed, casually mentioned that he wished there was some way to take good photographs for the inspection of sewers.

O'Toole, using the skills he had developed in skin diving and underwater photography while a member of a Navy underwater demolition team, set to work developing a special camera. He enlisted the aid of Hahnau, a skin-diving friend and retired jeweler (at age 32) skilled in working with minute parts and tools.

The first camera took still photographs at specified time intervals. But inside a sewer the system was complicated because of the great number of photographs that had to be taken. Use of a movie camera was of little help because it was too cumbersome to be easily pulled through a sewer.

A specially built TV camera proved to be the answer. In '59 Hahnau and O'Toole joined Intercounty Construction Co., which was doing sewer construction work in Florida. They eventually moved to Intercounty's Hyattsville, Md., headquarters to exploit their device. Because of its broad range of possible applications and because Intercounty wanted to restrict its activities to the construction business, Hahnau & O'Toole switched affiliation to M. H. Detrick.

One thing is certain: any device that can successfully inspect the inside of chemical pipelines won't wither for lack of work.

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$Me_2NCH_2CH(CH_3)CH_2$— (DMMPC*)
$Me_2NCH_2CH(CH_3)$— (DMIC*)

*Michigan Chemical product names for the chloride hydrochloride form of R. All commercially available.

Alkylation of amines:

$NH_3 + RCl \longrightarrow RNH_2$

$RNH_2 + RCl \longrightarrow RRNH$

$R_2NH \xrightarrow[2.\ RCl]{1.\ NaNH_2} RR_2N$

$R_3N + RCl \longrightarrow RR_3N^+Cl^-$

Alkylation of alcohols and acids:

$ROH \xrightarrow[2.\ RCl]{1.\ Na} ROR$

$RCO_2H + RCl \xrightarrow{base} RCO_2R$

Alkylation of active methylene groups:

$CH_2 \xrightarrow[2.\ RCl]{1.\ Na + alcohol} CHR$

Formation of Grignard reagents:

$RCl + Mg \longrightarrow RMgCl$

Reaction with metal salts:

$RCl + NaSH \longrightarrow RSH + NaCl$

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EQUIPMENT

Weldable Strain Gauge: A new line of weldable strain gauges—used to test stress and pressure on nuclear power loops, liquefied gas pressure vessels and systems, and heavy construction—has been developed by Electronics Instrumentation Division of Baldwin-Lima-Hamilton Corp. (42 Fourth Ave., Waltham 54, Mass.). BLH claims that its instruments have greater versatility than standard strain gauges, are the first to provide electrical stability from cryogenic through 750 F temperatures. The gauges come in two types: phenolic-bonded constantan foil (for temperatures to 500 F) and ceramic-bonded Nicrome V foil (for continuous 750 F or short-term 1000 F temperatures).

•

High-Speed Tester: Plas-Tech Equipment Corp. (Natick, Mass.) has introduced a new high-speed tester that measures tensile, flexural and compressive properties of materials at rates of loading ranging from 20 to 15,000 in./minute. The 581 model is air actuated, obtains stress-strain curves automatically using an oscilloscope and camera. The instrument has an adjustable mechanical stop and accessory equipment for performing stress relaxation tests in addition to conventional tests to the failure point.

•

Drain Valve: A self-draining valve, said to eliminate galling, is a new development by Jerguson Gage & Valve Co. (80 Adams St., Burlington, Mass.). The Jerguson No. 23 valve is recommended for installations in which it is desirable to have the valve seat inside the pipe or vessel wall and to prevent liquid holdup between the liquid container and the valve seat when the valve is closed. The valve has a separate gland follower that bears directly on the packing, independent of the stem-supporting yoke. The standard body material is carbon steel; stem material is hardened stainless steel. The valve has a 1-in. tank connection, a ¾-in. drain, and a ½-in. connection for steaming out.

•

Thermocouple Kit: Harco Laboratories Inc. (New Haven, Conn.) is out with a new test kit of miniaturized thermocouples. According to Harco, cost of the kit is low and the thermocouples are highly accurate. Each kit consists of: a spring-loaded unit for internal surface measurement; ceramic-beaded unit for multiple surface temperatures; probe-type unit for liquids, gases (up to 3,500 psi.); exposed junction-type unit for fluids (up to 3,000 psi.).

Flowmeter Readout

A new remote readout device that can be attached to flowmeters has just been developed by Badger Meter Manufacturing Co.'s Industrial Products Division (Milwaukee). The device may lead to lower-cost centralized flowmeter reading systems.

Although panel boards—which centralize liquid flow measurements—are not new, the instrumentation required in addition to the flowmeter itself is often too expensive to be justified. (Such instrumentation includes items such as differential pressure integrators, recorders that require outside power.)

But Badger's device doesn't require outside power because it has a self-contained generator, according to division vice-president, James Gridley. Another reported advantage of the unit: it uses low-cost doorbell wire for the signal transmission.

The new unit is attached to positive displacement-type liquid flowmeters (it can't be used on gas flowmeters). The chemical industry is already showing increased interest in this type of flowmeter. Reason: it becomes a mass flowmeter when corrected for temperature and density changes (*CW, April 29, p. 91*).

Rotation Is the Key: The Badger unit uses the rotation of the meter to generate an electrical pulse that is transmitted to a counter on a panel board. As the liquid passes through the displacement chamber it causes the meter shaft to rotate, moving an attached magnet. The magnet is mounted on the same shaft with a gear that has eight sections, four with teeth and four without teeth, As the gear rotates it turns another gear connected to a torsion spring.

Both gears rotate, building up tension in the spring until the gear mounted on the shaft hits a flat section. When this occurs, the gears are released under spring tension, returning the magnet back over the six coils to generate the pulse.

How Union-Camp's 5-Star Plan saved multiwall bag user over $130,000 a year

Making things the same can sometimes make a whale of a difference. Particularly in a multiwall bagging operation. The Smith-Douglass Company, Inc., of Norfolk, Virginia proved it recently when they put Union-Camp's 5-Star Plan into action. The difference—in annual packaging savings—came to over $130,000 a year!

Standardize = Economize

Initial 5-Star Plan surveys at Smith-Douglass' six plants revealed that *standardization* held the key to major cost reductions. Three plants used sewn open-mouth multiwall bags. One used sewn valve bags. The remaining two plants used both types of bags.

Union-Camp's multiwall specialists showed that $30,000 a year could be saved by converting all six plants to sewn open-mouth bags and using open-mouth bag filling machines.

5-Star Plan in action. Plant surveys made by Union-Camp multiwall specialists paved the way for the major packaging savings described here.

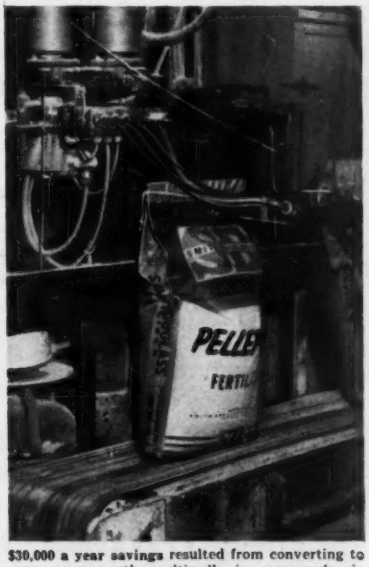
That was only the beginning. By carrying the change-over one step further, and standardizing on *size* and *construction* of multiwall bags, the company would save another $22,000 a year.

1 Design Replaces 160

Next, Union-Camp's survey team analyzed the company's existing bag *designs*. They found there were about 160 designs being used. Here, again, standardization was recommended.

By creating one basic design, eliminating an expensive yellow outer sheet, and using the same printing copy for all bags, the company netted additional economies of $84,000 a year.

$30,000 plus $20,000 plus $84,000. Total annual packaging savings—$134,000.



$30,000 a year savings resulted from converting to sewn open-mouth multiwalls in company's six plants.

How Much Could You Save?

Hundreds of companies—large and small—reduce their multiwall packaging costs by taking advantage of Union-Camp's 5-Star Plan. This comprehensive service is free. It covers bag design, bag construction, specifications control, packaging machinery and a survey of your materials handling operation. An improvement in any one of these areas conceivably could result in substantial economies for you.

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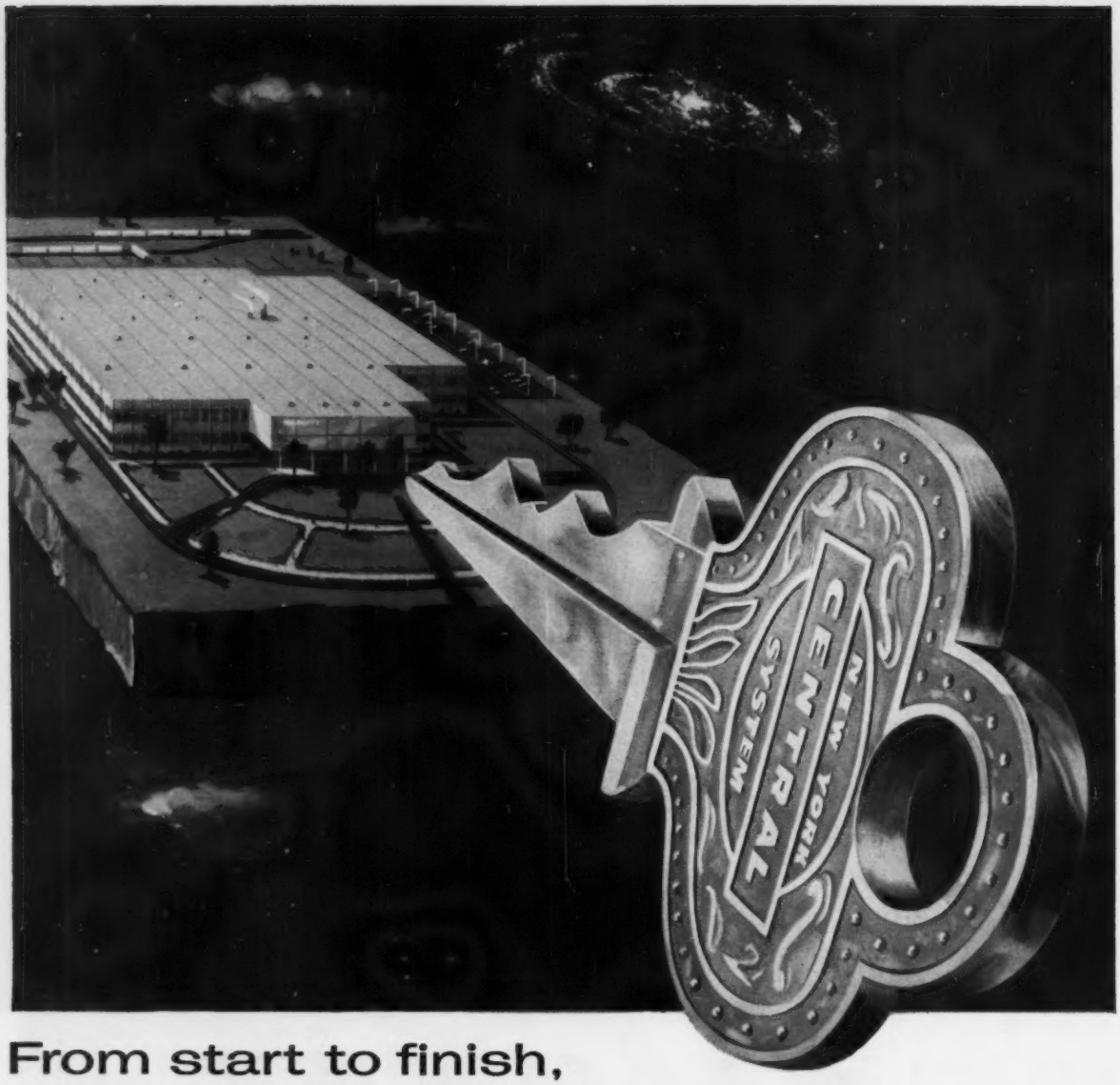

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Market Newsletter

CHEMICAL WEEK
May 27, 1961

Near-term prospects for segments of the chemical industry aren't as bright as they might be. That was the tenor of predictions made at the Chemical Market Research Assn's "Review and Forecast" meeting in New York late last week. Here are highlights of some of the projections:

- Foreign competition threatens dominant U.S. position in world synthetic rubber markets.
- Volume of U.S. fertilizer consumption will drop dramatically as use of higher-analysis concentrated materials grows.
- The U.S. chlor-alkali industry will show a moderate growth rate (about 4.5%/year) in the next five years.

World production plans for polyisoprene and polybutadiene—including proposed projects in Iron Curtain countries—indicate that the U.S. will "wind up behind rather than ahead of foreign competition" on these new elastomers, reported Goodyear's M. J. Rhoad.

Rhoad cited this supporting evidence: By '65, the U.S. will have estimated annual capacities for 120,000 l.t. of polyisoprene (a natural rubber substitute) and about 250,000 l.t. of rubber-extender polybutadiene. That adds up to an elastomer capacity of 370,000 l.t./year.

Projected capacity outside the U.S. by then will be in excess of 500,000 l.t. Significantly, some 400,000 of this (most of it for polyisoprene) reportedly will be built in the Soviet Union and in its satellites.

•

The '65 outlook for chlorine, caustic soda, soda ash and hydrochloric acid was spelled out by Dow Chemical's Leo Grant. Growth rate of these products in the half decade ahead will be considerably under the rate ticked off in the last 10 years.

Grant's production predictions peg chlorine output in '65 at about 5.7 million tons, indicating a 5%/year growth vs. 9.4%/year over the past decade; for caustic, 6 million tons, 4.5%/year growth as against an historical rate of 7-7.5%/year.

Soda ash production in the U.S. by '65, said the Dow sales manager, will hit over 6.1 million tons compared with '51 output of 5.46 million tons and some 5.6 million in '59. Hydrochloric acid growth, recently at about 5.1%/year, will remain rather steady, push production to about 1.28 million tons/year by '65.

•

Volume production of anhydrous hydrazine has just started at the Air Force's spanking-new $15-million plant at Saltville, Va. The installation was built by Olin Mathieson and will be operated by OM on a round-the-clock production schedule.

The entire output of the highly automated plant will go to the

AF under a three-year, $25-million supply contract. The liquid rocket fuel will be used to power Dyna-Soar, a boost-glide vehicle now under development, that is designed to carry a man on a pilot-controlled orbital flight.

The assured military volume outlet may well lower the high price that has long blocked a hydrazine breakthrough into large-scale commercial markets (*CW, July 25, '59, p. 41*).

Pentaerythritol prices are down 2¢/lb. The action, initiated by Hercules Powder and subsequently followed by other makers, fulfills the implication here (*CW Market Newsletter, May 13*) that producers would move to counter the earlier reductions in competitive glycerin.

The new penta quotes peg c.l. quantities at 29¢/lb., and l.c.l. lots at 30¢/lb. in the East. West Coast prices have also been reduced, but these remain 1¢/lb. higher than Eastern schedules.

A related move brings monopentaerythritol prices down 1½¢/-lb., to 29½¢/lb. (c.l.), 30½¢/lb., l.c.l.

•

The polyethylene market may be getting rough—again. The trade is buzzing with reports that quantities of molding and film resin are moving at prices ranging as low as 19¢/lb. (film) and 15¢ (molding). (Officially, these resins sell at about 32¢ and 27½¢/lb., respectively.)

When queried on the reports, though, major marketers were quick to point out that for the most part, polyethylene resins are doing relatively well at the moment, that prices on "first grade" material are "firm," despite industry overcapacity. There may be some cut-rate deals going on, says one marketer cautiously, "but it's probably on second-grade, or off-standard stuff."

At any rate, it is a situation that bears watching as new polyethylene projects and expansions are disclosed (*CW Business Newsletter, May 6*).

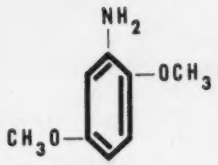
•

New emphasis on CPI marketing functions. It isn't a trend yet, but at least two majors, Pennsalt Chemicals and Dow, have put their purchasing groups under direct control of their chief marketing men. It's a switch to watch, since purchasing generally operates independently in most industries. The new moves, say the companies, should improve marketing-distribution-purchasing efficiency.

•

Spencer Chemical's overseas operations will be handled by its international subsidiary. Until now, Spencer's products have been marketed abroad by U.S.-based export agencies, but all such sales agreements have expired. In addition to handling an expanded marketing program abroad Spencer Chemical International will also "seek out profitable capital investment opportunities overseas," says Spencer president John Denton.

Eastman aromatic intermediates



1

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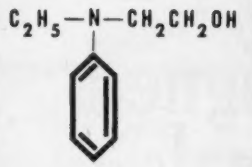
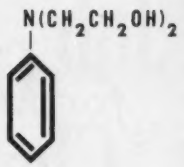


2

phenylethylethanolamine

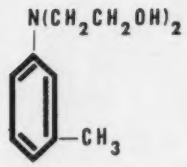
Undergoes typical reactions of tertiary amines and primary alcohols. Under suitable conditions the ring undergoes typical aniline substitutions.



3

phenyldiethanolamine

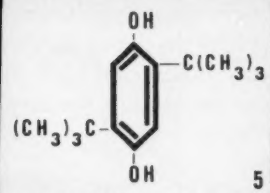
Undergoes the same types of reactions as phenylethylethanolamine.



4

m-tolyldiethanolamine

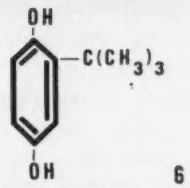
Undergoes the same types of reactions as phenylethylethanolamine.



5

2,5 di-tert-butylhydroquinone

Because of steric hindrance caused by the bulky tert-butyl groups, this is one of the few phenolic antioxidants for rubber which will not be extracted by aquous caustic. Is also a polymerization inhibitor for vinyl monomers and unsaturated polyesters.



6

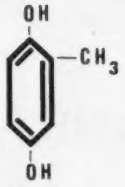
mono-tert-butylhydroquinone

The bulky tert-butyl group sterically hinders reaction of the adjacent hydroxy group, permitting selective reaction of hydroxy meta to tertiary butyl group.

7

tecquinol® (tech. hydroquinone)

With amines yields antioxidants for rubber and plastics. With phthalic and other anhydrides condenses to form dye intermediates, e.g. quinizarin.



8

toluhydroquinone

A promising raw material for organic syntheses. Undergoes the same type of reactions as hydroquinone.

9

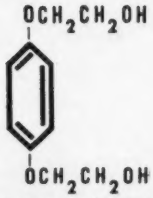
hydroquinone monomethyl ether

Benzene nucleus, activated by hydroxy and methoxy groups, is readily nitrated, sulfonated, or alkylated.

10

p-benzoquinone

Reacts with one or two moles of dienes. May often be used as an oxidizing agent when inorganic reagents are unsuitable. Reacts with diazonium salts to form phenylquinones.



11

di-(β-hydroxyethyl) ether of hydroquinone

Stable ether linkages, reactive ring hydrogens, and two available primary hydroxy groups suggest a useful raw material for organic syntheses requiring dihydric alcohols.

12

acetanilide

Used for preparation of sulfa drugs and dye intermediates and as an intermediate for various aniline derivatives.

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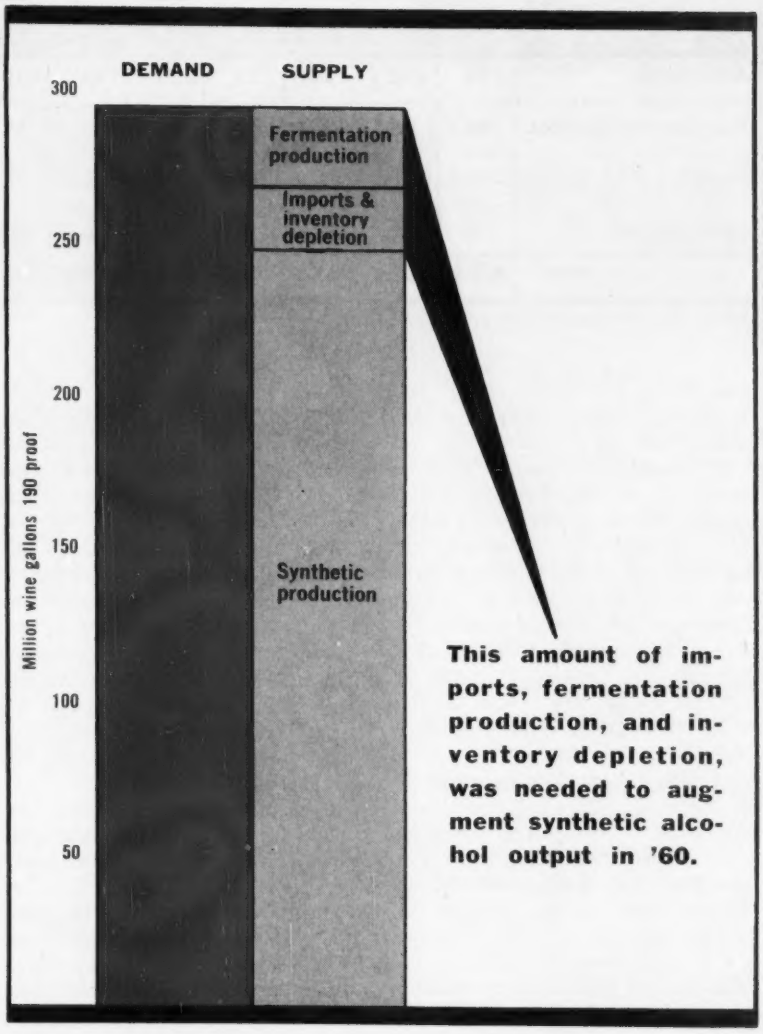

Ethanol Expansion Cue?

Fermentation alcohol producers see a golden market opportunity slipping through their fingers. Demand is at a record high—well above the capacity of synthetic alcohol producers — and seems likely to continue so. Moreover, there's low-cost raw material almost within grasp. But at best the fermenters are likely to make only short-term gains, for they face almost certain expansion by producers of synthetic material.

Right now, for example, fermentation alcohol producers are in a particular bind. Demand (estimated at 293 million lbs; *see chart*) is about 10% above U.S. synthetic ethanol capacity. Some buyers have met needs through imports, others have turned to inventories. And fermenters see 110 million gal. of molasses raw material dangling before them at a 10.5¢/gal. price. But it's Cuban molasses, and official Washington frowns on any deal with the Cubans.

True, the U.S. Dept. of Agriculture is likely to make some 15 million lbs. of surplus corn available soon to alcohol makers at an attractive price—still not set, but certain to be below 75¢/bu. (Government support price is $1.05/bu.) Publicker Industries is in the forefront of these negotiations (it also had lined up the molasses), and will likely get the lion's share of this corn—but it will probably be a very short-term deal.

Picking Up the Marbles: Thus, despite the scrambling by fermentation producers, synthetic alcohol makers seem sure to gain most by the steady rise in alcohol consumption—demand will reach an estimated 330-335 million gal. by '65. Right now, synthetic alcohol producers seem almost casual about the market opportunities—none of the major producers has said anything certain about expansion. Chances are, however, that synthetic alcohol makers will move before '65.

When they do, it will further weaken the position of fermentation alcohol. Long before Castro took over in Cuba, molasses, the prime fermentation raw material, was becoming expensive—it is widely used in the animal feed market, and feed makers can pay a higher price than can alcohol makers. Only eight years ago about 35% (96 million gal.) of U.S. ethanol was molasses-derived; last year, the figure was 6% (16 million gal.), and trade observers expect molasses ethanol to soon disappear as a market factor.

Imports Rise: Marketers have recently also been quick to step up imports to meet ethanol demand. Alcohol imports spurted to 12.8 million gal.—an advance of 12 million gal. over '59's total. During the first seven months of fiscal year '61 (July to June), imports almost reached 10 million gal. and prospects are good for a continued high level of imports, at least in the next 12 months. Reason: during '60, France had one of its best sugar beet crops, and beet molasses production hit 600,000 tons—200,000 tons over a normal year. Much of this will likely go into ethanol manufacture. Already some U.S. companies are dickering for a share of this production.

Demand Spiral: Meanwhile, industrial alcohol demand is expected to climb—but the pace in the next five years won't match that of the last five. Between '55 and '60 ethanol consumption rose 30%—'60's output was 67.7 million gal. over the '55 level of 225.8 million.

This increase was largely because ethanol-derived acetaldehyde output rose in that time from 116 mil-

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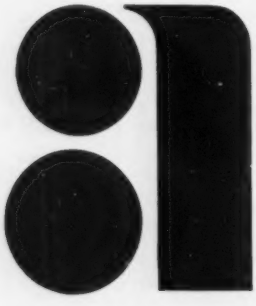
PHYSICAL PROPERTIES

ORTHO-ANISALDEHYDE

MOLECULAR WEIGHT...136.14
BOILING POINT (at 760 mm Hg)...238°C
MELTING POINTS...(1) 38-39°C*
(2) 3°C
SPECIFIC GRAVITY (liquid) 25°/25°...1.1274
SPECIFIC GRAVITY (solid) 25°/25°...1.258
REFRACTIVE INDEX n 20°/D...1.5608
ODOR...Burned, slightly phenolic
SOLUBILITY in H_2O—Slightly soluble
APPEARANCE...White to light tan solid

**Exists in two crystalline forms*



ANSUL CHEMICAL COMPANY, MARINETTE, WISCONSIN ● INDUSTRIAL CHEMICALS ✱ REFRIGERATION PRODUCTS ● FIRE FIGHTING EQUIPMENT

Industrial Ethanol Consumption

(million wine gallons, 190 proof)

	'55*	'56	'57	'58	'59	'60	'65
Acetaldehyde	**116**	**122.7**	**124.5**	**127**	**138**	**156**	**178**
Misc. chemical synthesis	**43.6**	**66.1**	**46.5**	**42**	**50.6**	**57**	**67**
Solvent	**59.2**	**70.9**	**64.0**	**64**	**65.9**	**71**	**78**
Other end-uses	**7**	**7.4**	**8.7**	**9**	**9.3**	**9.5**	**10**
Totals	**225.8**	**267.1**	**243.7**	**242**	**263.8**	**293.5**	**333**

* Fiscal years: July 1 to June 30

lion gal. to 156 million gal. (1 gal. of alcohol is used for each 6 lbs. of acetaldehyde).

In the next five years, however, production of ethanol-derived acetaldehyde will likely climb only about 14%, to roughly 78 million gal. One big result will be that ethanol growth, too, will be in the same percentage range—industrial ethanol usage in '65 will reach an estimated 330-335 million gal.

There are two key reasons for the slowdown in acetaldehyde from ethanol:

(1) One big acetaldehyde market—in the manufacture of butanol—is threatened by "oxo-process" alcohols.

(2) Under construction now is a new plant for making acetaldehyde directly from ethylene, skipping the ethanol step.

Currently, over 75% of acetaldehyde goes to production of butanol, which can also be manufactured by the oxo process. This method converts—by the reaction of carbon dioxide and hydrogen—olefin hydrocarbons into aldehydes and then into alcohols. Today, there is an oxo-chemical overcapacity.

It's a good bet that Texas Eastman and Carbide will utilize their oxo facilities to meet future butanol demand growth rather than expand their acetaldehyde facilities.

The direct route from ethylene won a new advocate recently when Celanese licensed the process of Aldehyde GmbH (a company jointly owned by Wacker Chemie and Farbwerke Hoechst A.G.) Celanese is currently constructing a 100-million-lbs./year facility at Bay City, Tex.

Also, Tennessee Eastman is reportedly eyeing the process and may decide to apply for a license in the not too distant future.

Solvent Use Gains: An imposing quantity of ethanol is also consumed each year as a solvent. During fiscal year '60, 71 million gal. were so used—a gain of almost 12 million gal. (20%) over '55's level of 59 million.

The solvent uses of alcohol fit into five major categories: (1) resins lacquers, etc., including proprietary solvents; (2) food products, cleaning preparations, brake fluids, cutting oils, and other industrial products; (3) toilet preparations; (4) processing food products; and (5) pharmaceutical products for external use.

Each of these major categories accounts for hundreds of specific applications. However, the actual gallonages going to these applications are comparatively small, and while some are making gains, others are declining.

In any case, no single outstanding solvent application is expected to upset the stable growth pattern of the past five years. It is expected that solvent requirements for ethanol will continue to expand slowly, to 78 million gal. by '65.

The other miscellaneous uses of industrial alcohol as a raw material that combined to take the remaining 57 million gal. of ethanol used in '60 are too numerous to consider in detail.

Among the most important: manufacture of acetic acid, ethyl acetate, ethyl chloride, drugs and medicinal products, rubber accelerators. Like the many solvent applications, not all of the miscellaneous chemical synthesis applications will grow during the next five years.

But as a group they should expand—about 77 million gal. will be used here by '65.

In summary, each of the major

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POLYETHERS and CATALYSTS

First step to better urethane foams...

TIGHT SPECIFICATION CHEMICALS

	PPG-2000	TRIOL G-1500	TRIOL G-3000	TRIOL G-4000
Specific gravity, 20/20°C.	1.003 min. 1.006 max.	— —	— —	— —
Volatility, wt.%	0.2 max.	0.2 max.	0.2 max.	0.2 max.
Hydroxyl number, mg. KOH/g.	54.5 min. 57.5 max.	107 min. 118 max.	53.4 min. 59.0 max.	39 min. 43 max.
Acid number, mg. KOH/g.	0.1 max.	0.2 max.	0.2 max.	0.2 max.
pH in 10:1 methanol-water solvent	5.0 min. 7.0 max.	— —	5.0 min. 7.0 max.	5.0 min. 7.0 max.
pH in 10:6 isopropanol-water solvent	— —	3.5 min. 5.5 max.	— —	— —
Total unsaturation, meq./g.	0.04 max.	0.03 max.	0.04 max.	0.075 max.
Gel test, flow time, sec.	10 max.	—	10 max.	10 max.
Potassium, ppm.	10 max.	10 max.	10 max.	10 max.
Water at shipment, wt.%	0.1 max.	0.1 max.	0.1 max.	0.1 max.
Ash, wt.%	0.005 max.	0.005 max.	0.005 max.	0.005 max.
Color, Pt-Co.	50 max.	100 max.	100 max.	100 max.
Appearance	Clear and substantially free of foreign matter.			

Jefferson is currently offering four polyethers which have proved most satisfactory for urethane technology . . . Polypropylene Glycol 2000, Triol G-1500, Triol G-3000, and Triol G-4000. The triols are propylene oxide adducts of glycerine; the number indicates the average molecular weight. All are made to rigid urethane specifications with emphasis on low unsaturation, low water content, low ash, low acid numbers, and controlled pH.

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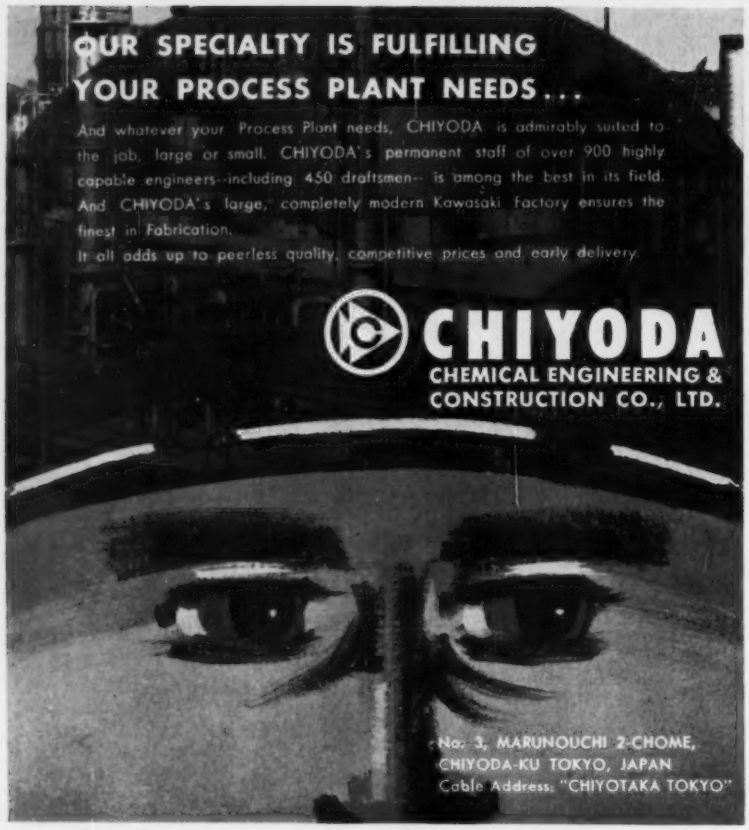
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MARKETS

Synthetic Ethanol

Producers and Estimated Capacities (million wine gallons, 190 proof)

Humble Oil	
Baton Rouge, La.	45
National Petro-Chemicals	
Tuscola, Ill.	48
Shell Chemical	
Houston, Tex.	20
Texas Eastman	
Longview, Tex.	20
Union Carbide Chemicals	
Institute, W. Va.	10
South Charleston, W. Va.	42
Texas City, Tex.	65
Whiting, Ind.	15
Total	**265**

ethanol market segments will register gains during the next five years, as long as the ethanol market price does not advance. And acetaldehyde production from ethanol will show the largest gallonage gain during this period—despite mitigating factors.

Despite this attractive growth picture, no major synthetic alcohol maker has moved to enlarge its capacity. The picture has remained almost constant for many years. In '60 five companies, at eight manufacturing locations, made up the producers' list. Their total rated capacity was 265 million gal./year (*see table above*).

The largest producer by far is Union Carbide Chemicals, with a total estimated capacity of about 133 million gal./year. It has plants at Texas City, Tex., South Charleston, W. Va., Institute, W. Va., and Whiting, Ind.

The other producers include Humble Oil, at Baton Rouge, La.; Shell Chemical, at Houston, Tex.; and Texas Eastman, at Longview, Tex. These companies have a combined production capacity of 132 million gal./year.

By '65, the gap between domestic demand and synthesis capacity may widen. Although no alcohol shortage is expected in the short-term future—with the availability of inexpensive foreign alcohol and the U.S. government subsidizing alcohol-from-corn production—a serious shortage could develop by '65 if no new synthesis production capacity appears.

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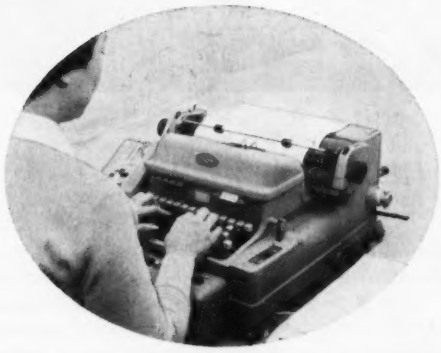

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NAUGATUCK CHEMICAL DIVISION **United States Rubber**

Probing the CPI's Promotion Patterns

Last week new light was shed on two of the oldest—yet still most preplexing—questions that face chemical advertising and sales promotion executives: How much should be spent and how should expenditures be apportioned?

The latest word on these topics came from two sources: a provocative discussion at the annual spring meeting of the Assn. of National Advertisers' Chemical Group (New York) and a new CHEMICAL WEEK survey to determine current spending patterns and trends in chemical process industries' advertising and promotion (*see charts*).

At the ANA get-together, Phil C. Coulter, advertising consultant for Union Carbide Corp., along with Du Pont's Gilbert Miller and Atlas Powder Co.'s James Gilruth, probed the subject: Are we aiming our advertising at reasonable and attainable objectives? Their discussions provide some new insights into measuring advertising's effectiveness, and the *CW* survey of 25 chemical processors shows how CPI ad and promotion men now allocate their budgets among various promotional media.

Proper Aim: To ANA's Chemical Group, Carbide's Coulter emphasized that behind the question "How much should we spend for advertising or promotion?" lies a series of other, more fundamental questions that must be answered before a meaningful conclusion can be reached. Examples: "What do you want your advertising to accomplish? Whom do you want to influence? How many of them are there? How much do they now know? How much do you want them to know, how quickly and how much is it worth to you if they do know?"

Advertising effectiveness can be measured, says Coulter, but first certain basic questions must be answered—e.g., exactly what is the corporate objective? Precisely what are the marketing objectives for next year?

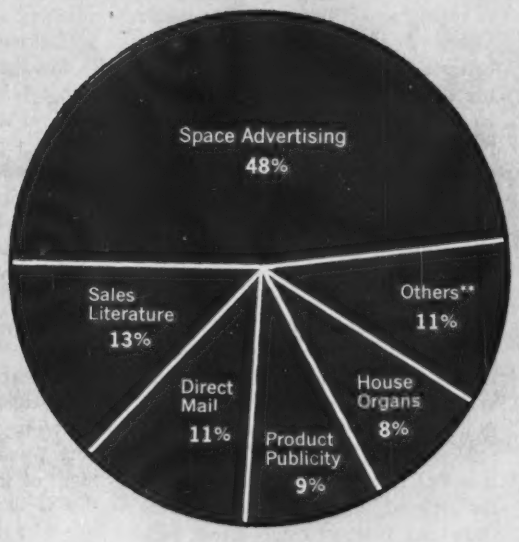
Another important requirement for measuring effectiveness: selecting proper objectives for ads. "Too often," says Coulter, "advertising is saddled with somebody else's objective that's looking for a home." The test for an appropriate ad objective is this, he adds: "Your objective must be something for advertising to accomplish, something that it can accomplish alone.

"If your advertising can't do the job alone, and you can't measure that job, then it would pay you to re-examine your ad objectives; chances are, you're dealing with something broader—perhaps a sales or even a marketing objective."

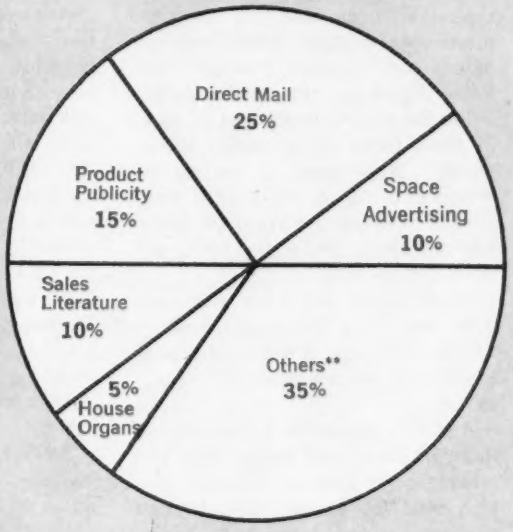
Basically, Coulter's thesis is that industrial advertising is most effective in reaching mass audiences to create awareness, comprehension and conviction about a company's products or services, but that it is unrealistic

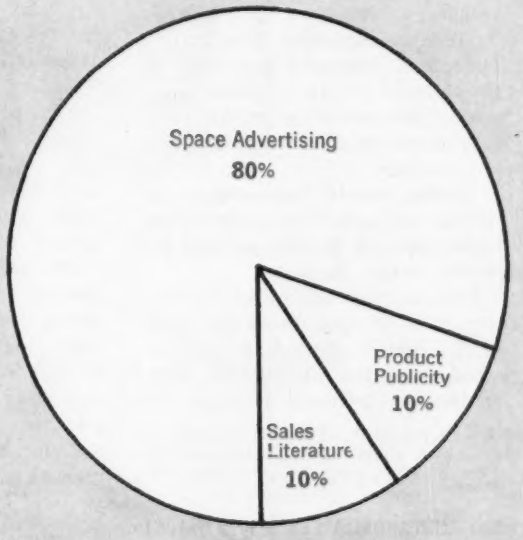
Where CPI Promotion Dollar Goes:

The average . . .



. . . and the extremes





*Averages from 10 companies
**Exhibits, promotion research etc.

to expect advertising to do the whole selling job alone. For that reason, he believes, the effectiveness of advertising should be measured according to its accomplishment of specific preplanned objectives, whether or not sales respond. "After all," he points out, "it's entirely possible that other factors — changes in the economy, population or competition — may nullify the effects of highly effective advertising."

Budget Breakdown: The *CW* survey of chemical promotion efforts throws light on another aspect of advertising effectiveness—how much CPI firms are spending now and for what purposes. The charts on p. 99 show how 10 CPI companies* allocate funds for several important promotional tasks and how strikingly these programs differ.

Space advertising clearly gets the biggest share of most CPI company promotional budgets. Sales literature, direct mail, product publicity and house organs are next, in that order.

But the relative importance of each of these forms of promotion varies greatly. While most of the survey respondents allocate 40-60% of their ad and promotion budgets to space ads, one spent only a slim 10%, another a hefty 80%.

Funds spent for sales literature (*CW, May 20, p. 95*) range almost as widely—from 7% in several instances to 45% in one company, the survey shows.

And CPI promotion budget allocations for direct mail ranges from absolutely nothing in one instance to a high of 27%; product publicity expenditures range from 5 to 15%; spending for house organs, 2 to 30%.

These variations stem from the differences in companies that make up the chemical process industries—e.g., product line, state of competition, company objectives, distribution and types of customers.

Spotting Trends: Perhaps more significant than current promotion budget breakdowns are the changes that are starting to take shape.

For one thing, direct-mail spending appears to be rising. More than 25% of the survey respondents plan to spend more for this purpose. One reason: the relatively low cost of reaching a limited market with highly specialized messages.

Another area getting more attention today is product publicity. Nearly 20% of the firms participating in the survey report that they're becoming convinced of the value of a steady flow of news items as a means of keeping the company name before potential buyers, projecting a modern, progressive image.

Sales literature, too, is undergoing rapid change and facing important new problems—e.g., obsolesence, lack of foreign-language literature.

Other Changes: In product vs. corporate image advertising, specific products promotion gets the nod from 80% of the survey participants. But this is likely to change. More than one-third of the companies say they plan to expand their corporate image advertising in the near future.

And concerning ad and promotion men's relationships to other marketing units, one-half of the respondents indicate that their promotional groups now report directly to sales management, while the other half are responsible to other company officials (president, executive vice-president or company communications management).

World's Fair Plans: In another of the ANA presentations, Allied Chemical's trade show manager, Bernard Thompson, reviewed plans for CPI participation in the New York City World's Fair in '64.

Thompson reports that no CPI companies have made firm commitments so far but that several (Du Pont, for one) plan to participate and are working on arrangements with fair officials.

Thompson cites several reasons for this relatively unenthusiastic attitude among CPI advertising and promotion men: lack of recognition by the official World's Fair governing body; high costs of exhibit space ($70/sq.ft for a two-year period vs. $4-6 that most trade shows charge); and the lack of interest in showing industrial products to a predominantly consumer audience.

All told, the ANA Chemical Group meeting and the *CW* survey tell a similar story: management is eagerly seeking better information on which to base its plans for more effective advertising and promotion. As this data becomes more readily available, look for new and rapid changes in promotional patterns to boost profits.

* Twenty-five firms responded to *CW*'s query; 10 supplied detailed data on relative expenditures for each aspect of advertising and promotion.

New CPI Challenges

Chemical processors, busy enough battling competition within their own ranks, now face renewed competition from some of the materials they have been trying to displace — i.e., steel, zinc, wool and cotton.

Among CPI areas that will be confronted by counterattacks: plastics and synthetic fiber producers. Carrying on the major assault are the official organizations representing the competing products.

Steel: The American Iron and Steel Institute this month enters its new fiscal year—and it may be a decisive year for steel marketing. Among AISI's latest developments: The Committee to Promote the Use of Steel was set up.

This group will assume over-all coordination of the promotion and publicity efforts of AISI's specific product committees—e.g., galvanized sheet producers, steel pipe producers. Another function: to promote the use of "Steelmarks" (labels for steel consumer products).

AISI has nearly doubled the number of the industry's promotional research committees this year. After studying basic industry problems in each area—structural steel, for example—the groups are now ready to launch specific promotion campaigns.

Another new steel marketing effort that's in the works: a motivation study of industrial designers. Here AISI plans to measure what influences designers in specifying construction materials, and what the institute can do to promote greater use of steel by designers.

Probably AISI's biggest program now under study would be aimed at the educational community. Objective: to bring this segment up to date on steel developments. Under consideration are films and traveling exhibits for college engineering, architecture and science students, as well as trade schools and high school science and home economics classes.

Zinc: This week the American Zinc Institute is making its first appearance at the Design Engineering Show in Detroit—the third trade show debut that AZI has made the past year. The institute is also pushing ahead its program of sponsoring university lectures, industry consulting, and pub-

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The TORNADO-MATIC combines many Fletcher "Exclusives"—from fingertip controls to automatic cycling and "double check" safety features—for exceptional efficiency under many processing conditions.

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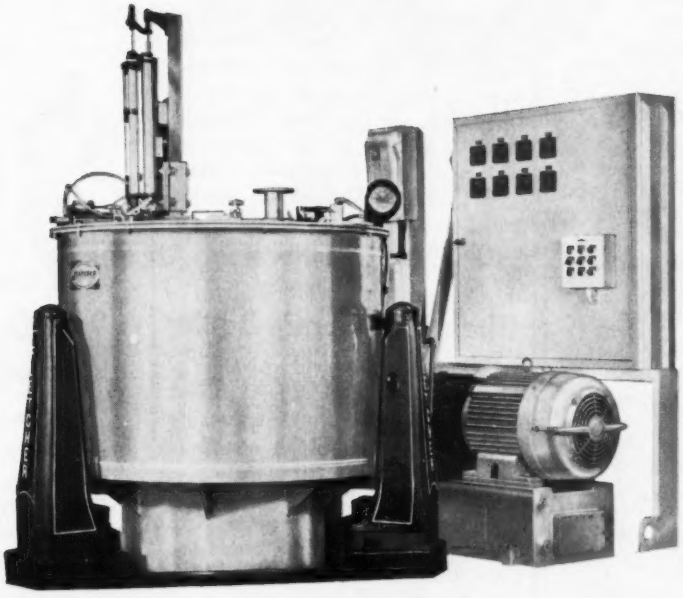

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SALES

lishing technical literature and news periodicals.

The Fiber Market: Producers of natural fibers such as wool and cotton are gearing for their biggest promotion campaigns. The Wool Bureau and the National Cotton Council, for example, are firming up plans for expanded programs next year.

The National Cotton Council, already spending 32% of its $3-million annual budget on advertising and publicity, plans to create a new research and promotion arm. By assessing its members $1/bale sold, the new Cotton Producers Assn. hopes to put $10 million into its coffers over the next five years. Consumer magazine and television advertising will be heavy.

The Wool Bureau, now setting up a new budget for its fiscal year beginning July 1 (last year the budget was about $1 million), hopes to launch a revised and reoriented advertising program. Biggest sales points: permanent crease and pleat and wash-and-wear wool. The change: it's switching from institutional to specific end-product promotion.

The bureau hopes to get under way this fall a two-part campaign in magazines, newspapers, radio and television. The first section, nationwide publicity, will be geared to new developments in the wool industry. Local advertising, on the other hand, will consists of cooperative ventures with local manufacturers in concentrated market areas, describing specific products at the retail level.

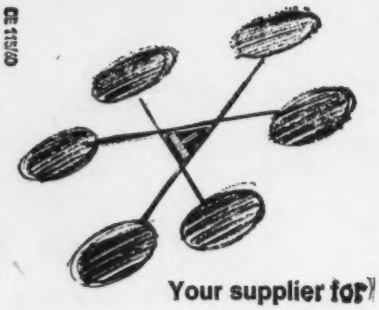
Chemical Comic Book

Last week Diamond Alkali Co. (Cleveland) published an offbeat piece of sales literature—a Western-style comic book designed to appeal to children 8 to 12 years old.

The 16-page booklet, "Diamond Deputies," dramatizes the applications of three of the company's herbicides: Crop Rider for weeds in crops, Fence Rider for mixed brush and weeds, and Line Rider for brush control along right-of-ways.

The booklet's unusual format serves two purposes: (1) a conventional piece of sales promotional literature for weed-killer purchasers; (2) an educational-public relations booklet for school children, who have lately avalanched the firm with requests for such material.

CE 115/60



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Reply to W. M. Jolly, Supervisor of Personnel

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Cutting Barge Costs

Two new barge designs—one for general bulk liquids, the other for refrigerated ammonia and LP gas—soon will get their first commercial tryouts in distribution of chemicals.

Phillips Petroleum Co. (Bartlesville, Okla.) soon will begin operating two newly acquired barges for anhydrous ammonia and liquefied petroleum gas — fully refrigerated (—28 F). The new vessels are the first large-volume barges designed to handle chemicals under refrigeration, according to Phillips. They are expected to move these products at lower over-all costs than by conventional high-pressure means.

Fewer Cleanings: In a more striking departure from standard practice, National Marine Service, Inc., New York-based inland waterways carrier, will soon launch five new barges designed to reduce expensive barge cleanings. New feature: dual cargo-carrying systems, each of which will hold maximum barge tonnage.

Using its new barges—four of them with 1,600-tons capacity, one with 1,200-tons capacity—NMS expects to reduce cleaning costs considerably by hauling certain chemicals in one of the two tank systems on each barge while the other is empty (called deadheading). The latter tank system can carry other chemicals on the return haul while the first system—which is not cleaned—deadheads.

Barge cleaning costs vary widely, but generally are about $400-$800 for a one-way trip. Cleaning cost may run as high as $5,000/trip—if exceptionally hard-to-remove products such as asphalt have been carried.

The firm will initially use the new barges in the "spot" trade, carrying products such as benzene, lube oils, edible oils, petroleum, asphalt and other industrial chemicals. The company hopes to pass any savings along to shippers, according to Paul Ellis, sales vice-president.

The six tanks that compose the outer cargo compartment hold 9,000 bbls., while the raised inner system of three tanks holds 10,000 bbls.

Another cost-cutting feature: 50-ft. widths (compared with the traditional 35 ft.) enabling the new vessels to carry about 50% more payload on Intracoastal Canals, where tow lengths may not exceed 1,000 ft.

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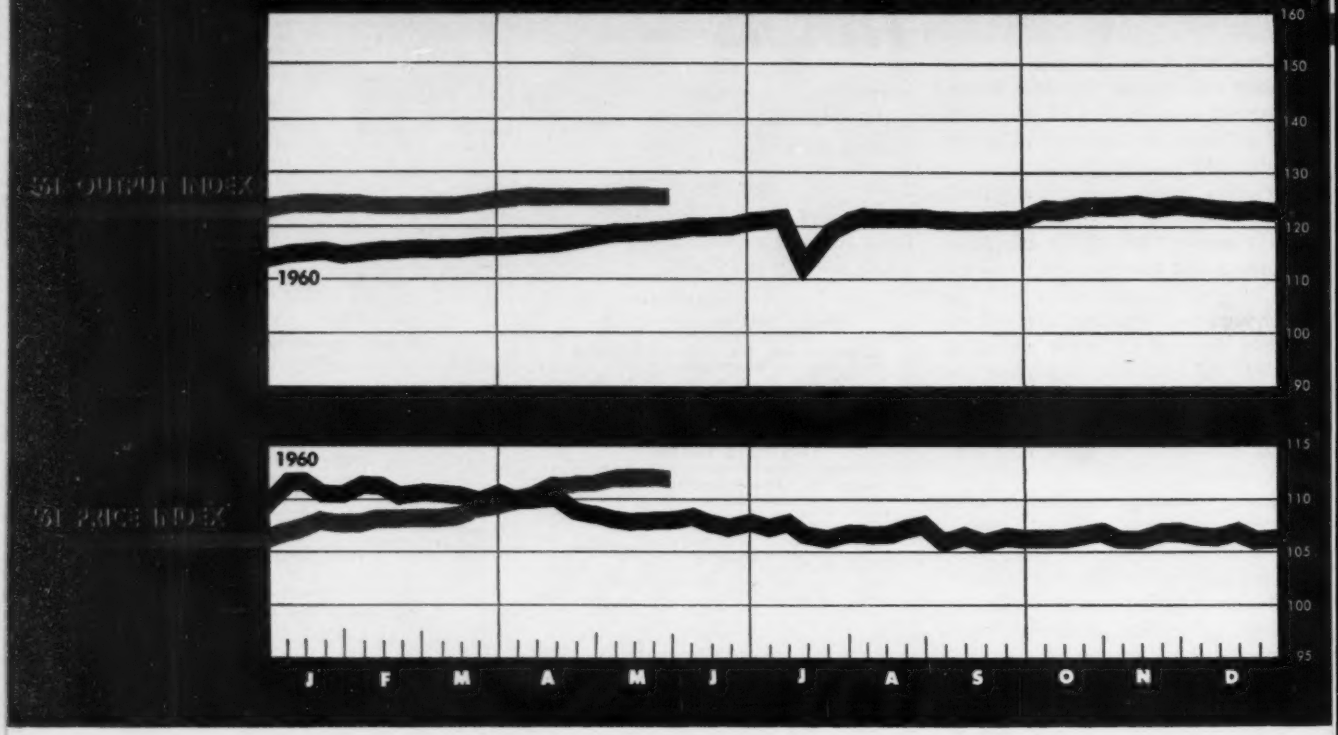
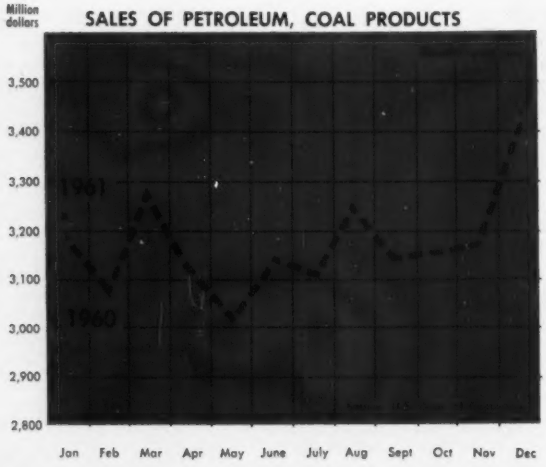


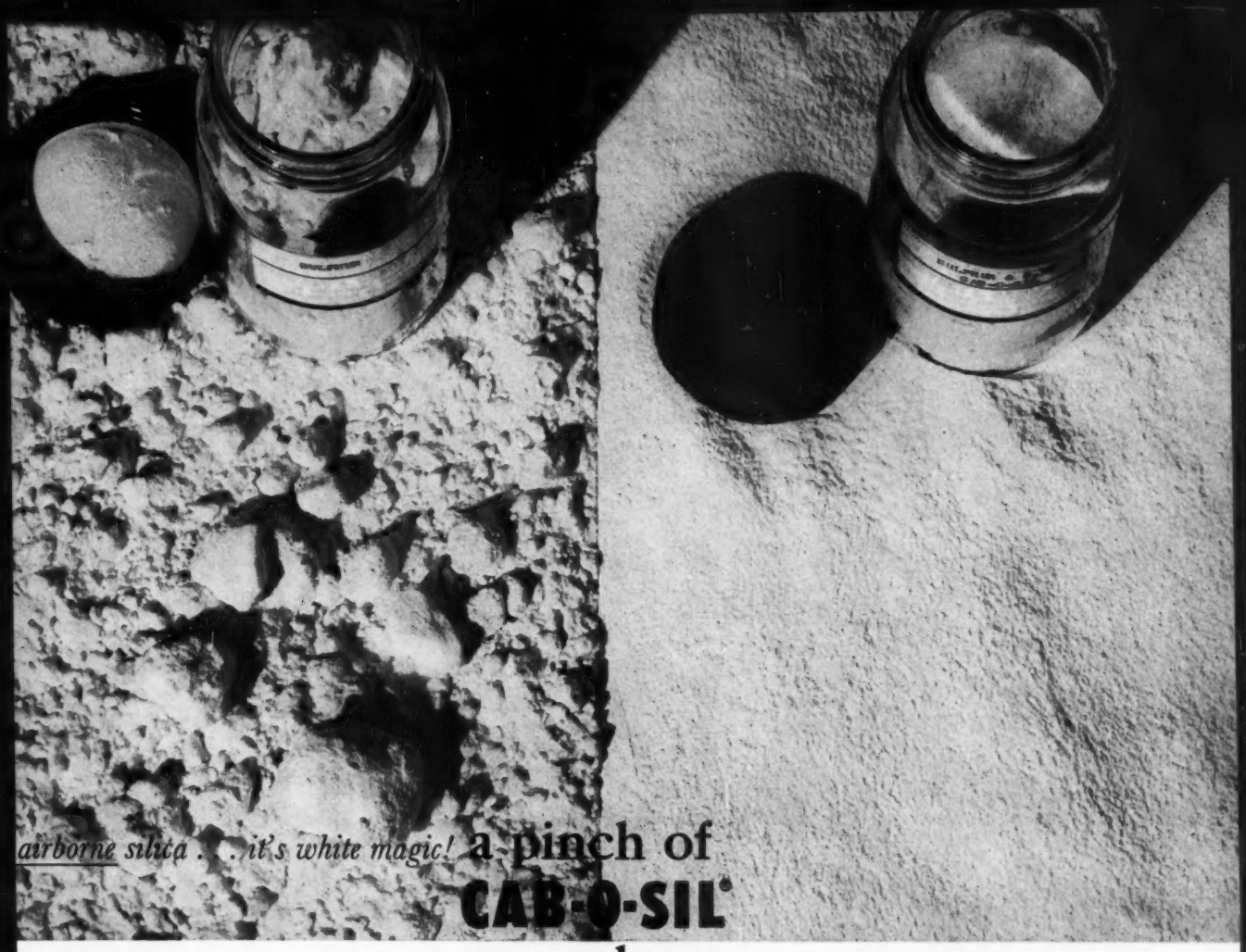
MAY 27, 1961

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	125.9	126.4	121.6
Chemical Week wholesale price index (1947=100)	112.9	113.3	108.9
Stock price index (12 firms, Standard & Poor's)	53.09	51.53	52.07
Steel ingot output (thousand tons)	1,988	1,943	2,102
Electric power (million kilowatt-hours)	14,278	14,206	13,710
Crude oil and condensate (daily av., thousand bbls.)	7,013	7,143	6,793

FOREIGN TRADE INDICATORS	EXPORTS			IMPORTS		
(Thousand dollars)	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
Chemicals, total	145.1	121.3	121.1	31.1	27.4	30.6
Coal-tar products	16.9	11.4	11.3	4.5	5.1	6.1
Industrial chemicals	28.7	19.0	24.1	10.8	8.1	9.5
Medicinals and pharmaceuticals	23.1	21.9	20.7	2.3	2.7	1.9
Fertilizers and materials	9.6	7.1	8.1	10.7	9.8	11.0
Vegetable oils and fat (inedible)	6.3	10.0	9.5	5.8	5.5	5.2

CHEMICAL CUSTOMERS CLOSE-UP





airborne silica . . . it's white magic! a pinch of **CAB-O-SIL®** works "free-flow" magic with caky sulfur

Add just 0.5% Cab-O-Sil, shake — and caky sulfur (left) is transformed into a free-flowing powder (right). As an anticaking agent, this superfine silica (11.1 million billion particles per gram) is used in amazingly low concentrations.

A mere pinch of Cab-O-Sil®, the superfine airborne silica, transforms sulfur, insecticides and other materials which tend to cake into smooth-flowing powders while maintaining desirable product properties.

Whether Cab-O-Sil performs its anticaking magic by acting as a "dry" lubricant, or whether its billions of spherical particles actually function like so many tiny ball bearings in separating the larger, caky particles, is not precisely known. But one thing is sure: Cab-O-Sil does the job . . . and in amazingly low concentrations (down to 0.25% in some cases).

Yet anticaking is just one of many useful characteristics of this versatile raw material. Here are just a few of the ways Cab-O-Sil is being used today:

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USES:

- **Thixotropic, thickening, gelling agent** — lubricating oils, greases, polyester resins, epoxy resins, plastisols, plastigels, organosols
- **Suspending agent** — paints
- **Flatting agent** — varnishes, lacquers, organosols, plastisols
- **Reinforcing agent** — rubber, silicone, latex film
- **Anticaking agent** — sulfur, insecticides
- **Antislip agent** — solvent-base floor waxes
- **Precoating material** — reproduction paper
- **Low temperature thermal insulation**
- **Pharmaceuticals and cosmetics — (See bulletin #cpha-1)**

Please send ☐ free Cab-O-Sil sample and other technical data checked

NAME.....

TITLE.....

COMPANY.....

ADDRESS.....

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Technical data available:

( ) General Properties, Functions and Uses (#cgen-1)
( ) Cab-O-Sil in Butyl Rubber (#crub-2)
( ) Cab-O-Sil in Dipped Latex Films (#crub-3)
( ) Cab-O-Sil in the Lubricating Grease Industry (#cgre-2)
( ) Aqueous Dispersions of Cab-O-Sil (#cmis-2)
( ) A Flatting Agent for Varnishes (#cpai-3)
( ) Cab-O-Sil in the Reproduction Paper Industry (#cpap-1)
( ) Cab-O-Sil in the Plastics Industry (#cpla-2)
( ) Cab-O-Sil in Automobile Polishes (#cpol-1)
( ) Cab-O-Sil in Pharmaceuticals and Cosmetics (#cpha-1)

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